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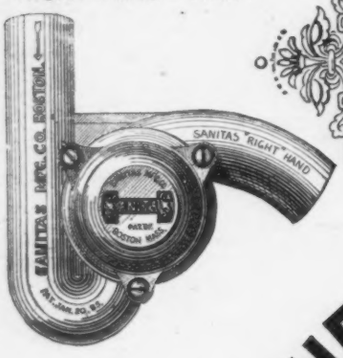

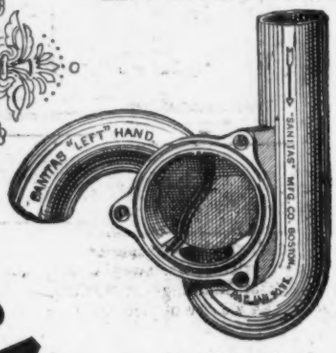

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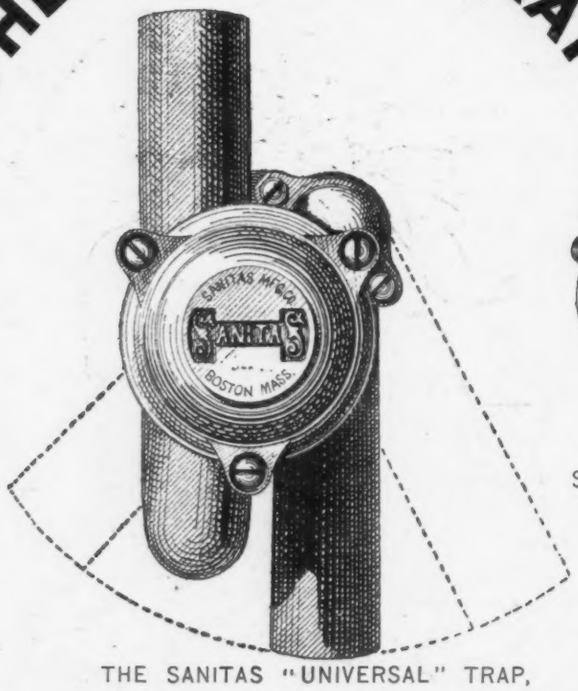

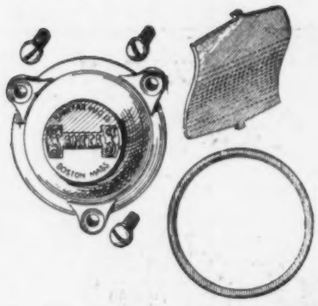

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THE city of Worcester, which lies inland, on a small stream, has for some time been considering the matter of a better system of sewage disposal than that now in use. At present, all the sewers of the town discharge into the Blackstone River, very much to the detriment of the people who live on the banks of the river below; and so much complaint has been made that probably nothing but the disposition of the city authorities to adopt some method of keeping the sewage out of the stream, as soon as a satisfactory one could be found, has prevented the exercise of the authority of the State to compel it to do so. The City Engineer, Mr. Allen, who seems to be quite worthy of the very high reputation which the New England city engineers, as a class, have acquired, was some time ago commissioned to study the subject, and devise a scheme of disposal; and his report has just been presented to the city authorities. The situation of Worcester, on rather high ground near the head of a fertile valley, naturally suggests a system of irrigation, and Mr. Allen has taken special pains to see if this would really be the best mode of disposal. After much study and comparison of facts, he concludes that it would not be the best, for reasons which are stated at length. One of the most important of these is found in the difficulty of purifying the sewage in winter. It is usual for writers on the subject to quote the example of Dantzic, where the sewage of a large city is spread by broad irrigation over a tract of land which never freezes, but continues all the year round to absorb and purify the liquid, as an example of the efficacy of surface irrigation at all seasons in the coldest climates. Mr. Allen says, however, that, although Dantzic is nearly eight hundred miles north of Worcester, and has an average temperature for the year somewhat lower than that of Central New York and Massachusetts, the average winter temperature is much higher; and a sewage-farm in Worcester County, at a season when one in Dantzic would be quite free from frost, would be covered with a sheet of ice, and therefore useless for purifying purposes. As an illustration of what might be expected, he describes the appearance of the Pullman sewage-farm on the occasion of a visit which he made to it in January. As he says, he found the entire surface of the farm frozen solid, and the sewage passing over it unpurified. This might do for Pullman, where, in his opinion, the profit to be made from the farm is the most important consideration, and the purification of the sewage is only secondary, but it would not answer for a large city like Worcester, in providing for which, as he also suggests, a much greater rainfall must be included in the calculations than is known in any large town in the north of Europe; and he concludes that the method of disposal offering the greatest advantages, with the least disadvantages, is that of chemical precipitation. The cost of the tanks, lands, buildings and pipes necessary for this purpose he estimates at about one hundred and fifty-three thousand dollars, which is certainly moderate for a city of fifty thousand inhabitants; and he considers that the cost of the process of purification will be about twenty-two thousand five hundred dollars a year, from which would be deducted whatever revenue might be obtained from the sale of the sludge. The principal considerations in favor of this scheme of disposal, which Mr. Allen sums up very clearly, are, that the cost of the plant will be less than that of an irrigation system; and the effluent will at all seasons be pure enough to conform to the requirements of the law in regard to the pollution of rivers, while the effluent from a frozen irrigation field would inevitably be so foul as to render the city liable to legal penalties; and if improvements should be made in irrigation, so as to make it desirable to adopt that system, the precipitation plant could be converted for this purpose, at small expense; while, in the particular case of Worcester, it should be remembered that the evaporation from an irrigation-field, which amounts in summer to about one third the volume of liquid poured upon it, would detract materially from the quantity of water flowing through the Blackstone River to the mills below; and although the proprietors of these mills might prefer to have clean, instead of foul water to turn their turbines, the quantity would be more important to them than the quality, and the city, by maintaining an irrigation system, would lay itself open to claims for damages on this account, which would not be incurred with precipitation processes, which would transmit the purified water with undiminished volume to the outfall. Altogether, the report is a most interesting and important one, creditable alike to the engineer and to the city authorities, who had the good sense to leave the question in the hands of a man known to be thoroughly competent to deal with it, and familiar with all the aspects of the case, instead of collecting at great expense the perfectly worthless lucubrations of a commission of amateurs, or hiring some celebrated expert to come from a great distance, spend a few hours in driving about the town, and write, mainly from inspiration, an oracular report on the whole matter.

THE *California Architect* reports the death of Mr. Levi Goodrich, one of the oldest and best-known architects in California. Mr. Goodrich was born in New York in 1822, and studied architecture in the office of his father, who was practising in that city, until 1849, when he joined the throng of emigrants to the land of gold. Before he left the vessel in which he reached California, he was engaged to take charge of the erection of a somewhat important building in San Francisco. He soon, however, left San Francisco for the Southern part of the State, and established himself at San José, where he spent the remainder of his life in successful practice, being entrusted with a large proportion of the most important buildings in that part of California. He was able to spare time, in the midst of his active career, for two visits to Europe, for study and pleasure, and was always deeply interested in professional matters, being one of the most prominent members of the San Francisco Chapter of the American Institute of Architects.

A GREAT competition is announced in France, for designs for a monument, or monumental building, to commemorate the French Revolution. The structure, whatever it may be, is to occupy the space where the Tuileries lately stood, together with the ancient court-yard of the palace, as far as the arch of the Carrousel; and an extraordinary degree of liberty is allowed to competing architects, to make the monument almost what they wish. According to the programme, the design may consist of one building, or of several, connected by porticos or galleries, or isolated, and the most important portion may be either a purely symbolic composition, or a building divided into rooms, in which to display, under cover, the creations of pure art working under the inspiration of the given theme. It is intended to spend about two and one-half million dollars on the structure, and this ought to be enough for a work worthy of its unrivalled situation. Framed on each side by the remaining terminal pavilions of the Tuileries, at a distance sufficient to prevent them from interfering with its effect, the monument will have a certain air of reserve, which will rather add to its dignity, while its interest will be heightened by the way in which, if well managed, its beauties will be gradually disclosed from behind the pavilions, as one approaches it from either direction along the new Rue des Tuileries. The distant

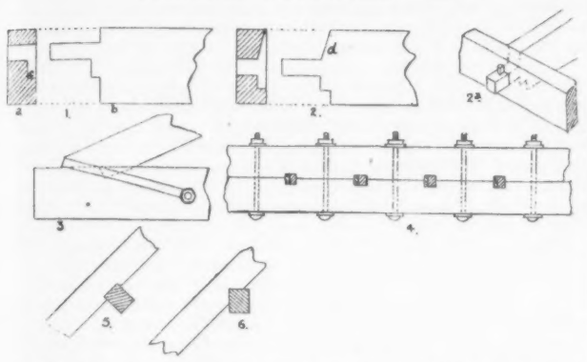
view of it will be somewhat different from any of the nearer views, but this ought to be the finest of all, since it will close one end of the renowned vista which terminates at the other end in the Arc de l'Etoile. Even the great sum intended to be spent upon it will hardly be sufficient for the erection of a building to compete in size with the gigantic Triumphal Arch, but a good deal less would answer for a much more artistic composition, and with the wings of the Louvre for a frame, and the garden of the Tuileries for a foreground, the new monument may, and probably will, present one of the most beautiful sights in the world. Naturally enough, the competition is restricted to French architects. There would be a sort of sacrilege in any attempt of foreigners, who are usually brought up to regard the name of the French Revolution as a synonym for all kinds of bloody excesses, to meddle with an attempt to symbolize by art the pure and noble enthusiasm which, as Frenchmen well remember, characterized its early days; and we hope that a subject so peculiarly French may serve to inspire a work as conspicuous in the history of architecture as the movement which it recalls has been in the history of the world.

ACCORDING to M. Viollet-le-Duc, many of our most efficient modern devices for the improvement of building materials and methods are merely re-inventions of things well known in the Middle Ages, and it must be acknowledged that he sometimes appears to be right. It has recently been reported in a number of technical journals that a certain German professor believes, on the evidence afforded by experiments made under his care, that timber which has been long immersed in water is no longer liable to the attacks of dry-rot. The theory on which he accounts for this is that the water slowly dissolves out the albumen and salts contained in the wood, and thus deprives the fungus of the nutriment necessary for its support. This is almost word for word the argument used by Viollet-le-Duc in advocating a return to the practice of water-seasoning invariably used by the Mediævals. As he says, the two years' floating which, even down to the time of Evelyn, was considered an indispensable preparation for structural timber, by dissolving out the albumen, sugar and soluble salts from the sap-cells, leaving only a mass of inert cellulose, not only freed the timber from any tendency to the fermentation by which dry-rot is nourished, but rendered it much less attractive to insects; so that wood seasoned by the ancient method rarely suffers from the borer. It seems probable that the advantages of water-seasoning are particularly noticeable with oak, which, we must remember, was the ordinary framing lumber, even in this country, until within a comparatively recent period; and the floating which most of our spruce lumber gets before it is sawed certainly does not render it invulnerable to dry rot; but it may be that the resinous sap of coniferous woods needs a longer time or a different solvent to remove it, and that a prolonged soaking would convert even that unreliable material into cellulose so inert and unchangeable that, to quote one of the German professor's experiments, sawdust made from it, when buried in damp earth, would "remain in the ground wholly unchanged." We do not know, by the way, whether any scientific person has noticed the difference between various coniferous woods, particularly pine and spruce, in their behavior in contact with the earth in their natural state. In some parts of New Hampshire, where white pine and spruce grow side by side in the forests, it is usual for the farmers, after clearing a piece of woodland, to extract all the stumps of the pine trees, at great expense, by means of a machine hired for the purpose, while the spruce stumps are left untouched. To the uninformed there is something eccentric in this picking out of a few stumps here and there in a field for extraction, but the farmers explain their conduct by saying that in a year after cutting the trees down the spruce stumps will be so rotten that a plough can be driven directly through them, just as if they were so much earth; while the pine stumps never rot, and must be pulled up before the land can be tilled.

ALTHOUGH architects here have a good deal to contend with, they at least escape some of the annoyances which disturb the peace of mind of their brethren in Europe. Foremost among these must be the necessity of accommodating their notions to those of the various sentimentalists in authority with whom they have to deal. With us the architect himself is usually the only sentimentalist concerned in his work; but there he must exert himself to please an unlimited number of archæologists, critics and dilettanti, who by no means agree in anything except their disposition to find fault with him. Those members of the profession who engage in the restoration of ancient buildings have perhaps the hardest time, but they, being sure of pleasing nobody, are perhaps invulnerable to criticism. The *Builder* tells about a certain clergyman who, having charge of an ancient church, was officially remonstrated with by the Society for the Protection of Ancient Buildings, because he wished to add to it an organ-loft and vestry, which, as the Society informed him, would tend "to spoil the church as a mediæval building." If it had been the architect, instead of the rector, who had made the proposition, the Society would probably have added some reflections at his expense; but the profession escaped in this instance. There are degrees, also, of archæological science to be taken into account, as where the same society was informed that an old church had been altered, "with the most reverential attention to the conservation of the ancient building," which had in fact been "conserved" by pulling it all down and using the old materials in the new structure. Another class of deities whom the English architect must propitiate is to be found in the critics, among whom Mr. Ruskin stands easily first. The other day some incautious Christians, who had built a cheap mission chapel in the suburbs of London, applied to this great man to help them pay for it. Instead of money they received some advice, of greater value, probably, than any pecuniary gift that the critic could bestow. "Why," he asked them, "did they build churches that they could not pay for?" "Why did not they preach behind the hedges, rather than run into debt?" "And of all manner of churches thus idiotically built," he was kind enough to add, "an iron church was to him the damnablest." Mr. Ruskin is said to have just joined the Roman Catholic Church, and this may account for his asperity in talking to evangelical Protestants; but the story shows how cautious one must be in dealing with such persons.

EVERY one is interested in the progress of the art of blowing up one's fellow-men, and the names of the mysterious explosives known as melinite, roburite, and so on, are familiar to all who read the newspapers. At present, the German Government appears to have adopted roburite as the most suitable substance for demolishing Frenchmen, and is laying up great stores of it for future use; while the French Government thinks it has discovered in melinite a material as destructive to Germans as the roburite is likely to be to its own subjects, and keeps the manufactories where it is made busy night and day in accumulating a vast provision of it for the time of need. As we all know, the French are enthusiastic, while the Germans are phlegmatic; and some of the Gallic ardor for action appears to have communicated itself recently to the melinite, a magazine of which blew up, killing, by mistake, several of its friends. Not to be behind in the race for distinguished destructive position, the Swedish officials have now begun a series of experiments with explosives, and have evolved a compound known as "bellite," which is inexpensive, easily made, and not liable to spontaneous explosion, but which develops, when intentionally fired by a spark, a force thirty-five times as great as gunpowder, and greater by fifteen per cent than that of gun-cotton. To make bellite, it is only necessary to treat benzine with a mixture of sulphuric and nitric acid. The sulphuric acid should be of the fuming kind, which is nearly free from water; and the proportion of nitric acid should be somewhat larger than that of the other. By keeping the mixed acids in contact with the benzine for some time, at a temperature rather above that of boiling water, the benzine is converted into trinitrobenzine, which is washed, so as to clear away all traces of free nitric acid, and then mixed with nitrate of ammonia, which is the common substance used for producing nitrous oxide gas. The mixture, if the free acid is thoroughly washed away, is very stable. Unlike dynamite, which explodes so readily from concussion that in heavy blasts only every tenth cartridge is fired directly, the others being all exploded with certainty by sympathy, a charge of bellite cannot be ignited by a blow or by friction. A shell charged with it strikes its object without exploding, unless a fulminating fuse is attached to it, and a magazine filled with it may be struck by projectiles without danger. When applied to use, however, its force is enormous. A charge of less than half an ounce, placed in a mortar behind a shell weighing ninety pounds, projected the shell to a distance of nearly four hundred feet, and its efficacy in detaching rock in a quarry proves greater than that of any nitro-glycerine compound.

JOINTS IN WOODWORK.[1]—II.



IN the last paper an endeavor was made to show that the system of wood construction in this country was open to considerable improvement, and more especially in the matter of joints. We will now take one or two other joints which appear to be improperly formed. The most important of these is the "tusk tenon." This joint is so extensively employed, that although it formed the subject of a short paper contributed to a contemporary some time since, it may be again mentioned here. The practice is to frame the joint in the manner shown in Figure 1, which illustrates the header *a* in section, and separated from the trimmer *b*. Taking a joist ten inches deep, as an example, the American framer will measure two inches from the top, will make the tenon itself two inches deep, and will form the bearing surface *c* beneath. This with a wedged key through the projecting tenon completes the joint.

Considering how frequently the joint occurs in all descriptions of buildings, it can be seen that it is of great moment to form it accurately. Beyond this, the weight carried by the header is great comparatively to that carried by the other joists, which increases the importance of accuracy. Considering further that the centre of a beam supported at its two ends, is substantially the neutral axis, it is not difficult to understand that the proper place to pierce the tenon is on that line. An inch cut out of the top or bottom of a beam will weaken it more than two inches cut away from the centre, so that if the tenon be placed higher or lower than the centre, it will do more harm corresponding to the distance. A further source of weakness is the fact of the liability of the tenon to split off under the weight, and to prevent this it is advisable to form the shoulder *d* as shown in Figures 2 and 2 *a*, which represent the exact form of the joint as it may best be constructed, and as it is almost universally employed in Europe, and in some few sections of this country. It is hard to see how the first form can be justified, for, leaving out the shoulder *d*, the labor is the same in both cases, although the strength is decidedly less in the latter.

It is not too much to say that no careful architect will permit the use of this form even in the smallest or most simple building. The shoulder *d* might be omitted, although it adds a good deal to the strength; but the most important thing to assure is that the tenon pierces the header at a point one-half way down its depth.

The effect of shrinkage in timber, and its important bearing upon the form and execution of joints, has already been pointed out. In some positions a joint may be subjected to the effect of dampness: in such cases it must not be forgotten that the effect of the dampness will be the exact reverse of the shrinkage, the timber swelling in precisely the same manner only in the opposite direction to that in which it shrank. In forming all joints subjected to the effect of occasional or periodical dampness, due allowance should, therefore, be made, both for shrinkage and expansion.

Associated with joints is the important question of connections, such as straps, bolts, pins, keys and wedges. Iron straps or bolts are employed to a great extent in connecting rafters, and the principal members of all large framed structures. The various forms in common use will be found indicated in the text-books, so that it is not necessary that special attention should be given to them here. The bolt used for connecting the foot of a principal rafter to a tie-beam shown in the last paper, page 51, is largely used but is objectionable, as it not only weakens both timbers by passing through them, but is itself likely to bend under an unequal thrust: a strap passing around the members is much better. Probably the best connection is that shown in Figure 3. Here the strap supports the rafter in the proper position to resist the thrust, and does not injure the beam as it is pierced through the centre. The joint too, is rendered simpler, and we should be glad to see this joint employed to a greater extent than it is.

Pins are useful connections, and should be used oftener than is customary. In most of the old-time framed structures, which are so well known for their strength and endurance, it will be found that several pins are used in addition to good joints at every connection. Pins are best made of well-seasoned wood (locust and white-oak answer admirably), straight in grain, and of a hard variety.

The use of keys is important, especially in the various methods of joining timber together in the direction of its breadth and length. They should be cut out of the beam in such a way that the shearing strain to which they are subjected acts across the grain. The main use of wedges is to force the parts together, and with this object they are formed with slightly inclined surfaces, and are driven in from opposite sides of the beam. As the shrinkage of keys defeats the object for which they are intended, it is well in all important structures to employ keys formed of metal. Metal, however, in such positions, whether it be straps, bolts or wedges, must always be covered with a material to prevent oxidation. And it is worthy of remark that ordinary paint is not sufficient, unless the metal be in such a position that it may be readily got at, to permit of painting at intervals.

Wedges occur frequently in conjunction with joints, and if properly formed and driven in, constitute an efficient aid. A wedge should be tapered just sufficiently to give an equal bearing on both edges, due allowance being made for the shrinkage of parts. It is of some moment that they should not be sawn out of the log unless a piece of straight-grained stuff is to be had. The proper method is to tear them off from the piece, by which means a straight or even grain will be assured, and the liability of the wedge to split into pieces be removed. Glue is usually employed to keep the wedges in place, but white lead is much better for exterior work, as it will not be affected by the weather.

A point generally lost sight of, in relation with straps, bolts and such connections is that, with the natural shrinkage which takes place, they require tightening up occasionally.

The method shown in Figure 4 is a good one for joining timber in the direction of its depth, but the efficiency of the joint will be lost after a time, by the shrinkage of the timber, if the bolts are not tightened up. Here, and in other cases where bolts are used, a washer should be placed not only under the nut, to prevent tearing up of the fibres of the timber while tightening it up, but also under the head, to prevent its sinking into the wood. The latter is often omitted, but in good work it will never be neglected.

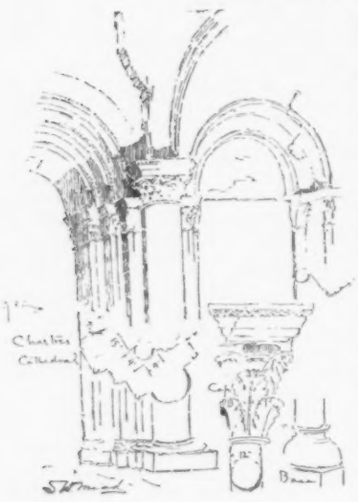
The method of framing purlins in roofs is another striking instance of the extent to which ill-considered construction is employed. Frequently the purlins are framed with the greatest scantling vertical, as in Figure 6, instead of at right-angles to the rafters, as represented in Figure 5. Probably the object is to save the time in the cutting-in of the rafter, for the triangular piece in Figure 6 could be cut out of the rafter in probably a little less time than the notch in Figure 5; but the saving is more apparent than real.

A beam should, broadly, be framed with its greatest scantling at

[1] Continued from page 52, No. 579.

right-angles to the pressure it has to sustain. Thus, in a floor-joist, the larger scantling is vertical. In purlins the pressure or strain is substantially at right-angles to the rafter, and this can be understood when it is remembered that the weight upon the purlin will cause it to bend or sag between its two points of support. The object being to place the greatest depth at right-angles to this pressure, which is in the plane of this curve, the purlins will be placed at right-angles to the rafters. ARTUS.

SKY LINES.



EVERY one who has given much attention to the subject of design, has, I fancy, some one particular canon of taste to which any architectural study must conform in order to be attractive. Undoubtedly, the main requisite in all plans is adaptability to the needs of those who are to inhabit the building, when materialized. Where this condition is not carefully met, no design, however admirable, can possess more than a very general interest. But where the preliminary conditions have all been fulfilled, and the floor plans and general scheme of elevations have been satisfactorily arranged, there still remains a very important point to be considered, and one, it seems to me, that deserves special mention, because it is so often and so completely ignored by both amateur and professional architects. That is the question of sky lines. Next to adaptability it should receive the most careful attention.

We are all happily more or less near-sighted. In viewing a field, an orchard or a landscape, we do not see the details of their several components. Were this not so, we should be overwhelmed and bewildered by the multiplicity of images. In the very excess of what we saw, we should see nothing. But we are conscious only of lights and shadows, of masses of color against neutral backgrounds, and of groups and outlines. It is from these that our impressions are received. If we analyze our preference for certain trees and shrubs, we shall find that it is seldom the shape of the leaf, or the texture of the bark that decides our choice. It is rather the color, effect and general outlines of the entire plant. Of all the trees that grow, there are few that excel the elm, the beech and the oak in beauty, yet when examined near at hand, their leaves are comparatively coarse and unattractive. In elegance of outline they are decidedly inferior to those of the maple, and still more to those of the bilshed, the delicate curves of which are worthy of more frequent imitation. Nevertheless, a bit of clear sky framed by the tracery of far-reaching elms is a picture in itself.

It is precisely the same with our houses. The impression produced is due to the outline, and the color tone. At any distance one is not conscious of the details and decoration, unless they are excessively striking, and that is always out of taste. The effect is produced by more penetrating characteristics. If the color and grouping of a building are bad, they strike the observer at once, and however beautiful particular features of the structure may prove on nearer examination, he is not disposed to be appreciative, if the first impression has been unfavorable. The value of effective coloring is well understood. At the present day we introduce color into our designs with almost Oriental license. It is not a tendency therefore which needs further encouragement. We require, rather the restraining hand of chromatic discrimination. In our attention to form and outline, however, we have been less assiduous. It is a very rare thing even among expensive buildings, to find perfectly satisfactory sky lines from all points of view. I have in mind now a rather expensive country-house, which was illustrated in a recent issue of an architectural paper. The floor-plans were admirable, and gave a succession of pleasant apartments opening into each other in a way to tempt constant hospitality. The materials had been well chosen, and up to the eaves the arrangement was very effective. But here all exterior beauty ended. The roof had been so badly managed, that no amount of decoration could render the mansion pleasing. In the place of repose, there was a Jack-in-the-box expression, as if the building had popped up from amid its surrounding foliage to take an observation, and might in time be expected to subside. No ingenuity in coloring or setting could appease its look of unsatisfied expectancy or make it harmonize with the landscape. Yet a very few changes, a more careful disposition of lines and angles would have made the design in perfect keeping with its environment and attractive to even the most critical.

The chief fault in the management of the roof lines of this design, and of the host of others which fail so utterly in this respect, is not difficult to find. Some predominating feature to which the others could have been properly subordinated was needed to give it character and dignity. In its absence there was a manifest lack of unity in the composition of the roof, and consequently of the whole house. The several gables, being all nearly of equal dimensions, were confusing, and distracted the attention. There was absolutely no one point upon which the eye could rest with any feeling of repose. In the case of more pretentious buildings, the liability to error is even greater. It is a tradition, handed down to us from the designing of cottage architecture, that a sloping roof is permissible in only one story of the house. In place therefore of an integral design, our larger houses are very apt to assume the appearance of a cluster of smaller dwellings, which might perhaps have been annexed by one of the more prosperous tenants as improved circumstances permitted such an addition to his domicile. This gives a roof, broken up into a succession of unimportant gables, and a sky line which is consequently devoid of either picturesqueness or dignity. In our dry and sunny climate, where ample porches are an essential feature of all country-houses there is another possibility for incongruous results, which should not be forgotten. Where the site is chosen on high ground, and unrelieved by foliage, or where the building is located on a cliff and stands out boldly against the sky, the porches become an important element in determining the outline, and should receive hardly less careful study than the main roof. Whenever possible, it is a great advantage to have some connection between the roofs of the porch and house, or at least some conformity in the angle of slope. Where this can be managed, it removes the otherwise unpleasant suggestion that the porch was an afterthought, and added subsequently to the building of the house.

Judged from our standard of impressive sky lines, it will be found that there are few designs for exteriors which are perfectly satisfactory. But if those who are engaged in architectural work will analyze the effect produced by their creations, they cannot, I think, fail to discover that this single feature determines in a large measure, the effectiveness of any design. HANFORD HENDERSON.

ITALIAN MARBLES.

THE Italian marble trade is of considerable importance. It centres in Carrara. It is calculated that there are annually extracted from the quarries in the neighborhood of this town alone something like 200,000 tons of marble representing a money value of over a million sterling. Upon this the Italian Government takes toll to the extent of £20,000 a year, in the shape of a direct tax of 10 centesimi (a penny) on every cubic palm raised. A palm measures in length 9.81 inches, and is to the Italian quarryman what the foot is to the Englishman. Four cubic feet equal rather more than seven cubic palms, the exact equivalent being 1 to 1.81.

The whole range of the Apennines is singularly rich in deposits of marble; but the white marble found at Carrara, and known all over the world is the most famous. The name Carrara is derived from the Latin *quarrariæ*, whence our English word quarry. The population of the town numbers some 25,000 souls, nearly the whole of whom are engaged in the trade. The people are exclusive; they speak a sort of language or patois of their own, dignified by the name of Carrarese. Human life is not set at so high a value as it might be, stabbing affrays being lamentably frequent; but it is of almost unknown occurrence to hear of mischief to the stranger within the gates. The numerous *studii* and work-shops are like so many cellars built on the street level under the dwelling-houses. They admirably answer the purpose of being shady and cool to work in, but afford no opportunity for the sculptor to display his handiwork. A small stream runs through the centre of the town, and affords the motive power to saw-mill after saw-mill. In the Academy there is a large collection of models and casts from the greatest works in sculpture — ancient and modern. From sixty to seventy pupils, who are taught drawing and modelling, are regularly in attendance.

The marble when brought from the quarries is conveyed to the seashore at Avenza, which is about five miles distant from Carrara. It is sent thence to Leghorn in small coasting vessels called "*navicelli*"; from Leghorn it is exported to all parts of the world. A considerable saving would be effected if sea-going ships could load at Avenza itself. At present there is the cost of transportation to another port, and the consequent double handling. It is quite practicable to make a good harbor; but hitherto local enterprise has contented itself with building a pier, from which the small craft are loaded. A railway connects the pier with some of the quarries; but the bulk of the traffic goes the old way by road, and on bullock wagons. The journey down is a slow and terribly toilsome process. A

team of bullocks takes a whole day to complete a single journey from the quarries to the seashore; the mountain road is more like the bed of a torrent than a beaten track.

The quarrymen are a prodigiously hard-working race of men. In the summer it is too hot for them to work in the middle of the day; but long before the day breaks they commence their ascent of the mountains and climb three, five, and some of them six miles before they reach the scene of their labors. When the sun is high enough to force them to retreat they have done a good day's work, and a long march home in the burning heat is before them. These men earn wages which average some 15*s.* a week; they are paid fortnightly. Not being a thrifty race, a good portion of the scanty wage goes in liquor and the lottery, and nature is kept going till next pay-day on a fare in which a miserable black bread is the principal factor. The men work in gangs. Each gang is under the control of a head man, who agrees with the owner of the quarry to get out the marble at a fixed price per cubic palm. The getting of the marble is dangerous work. The quarries are just so many openings cut in each side of the valleys into the mountains. The blocks are loosened from their beds by the ordinary process of blasting, and are then suffered to slide down by their own weight. As they fall down the mountain side large fragments are knocked off them right and left, and this rough usage is the cause of many of the flaws and vents which are afterwards developed in the working.

On Sundays the market-place at Carrara is a sight to be seen. It is filled with quarrymen from the mountains, sculptors from the *studii*, and country people in picturesque attire from the surrounding villages. In this same market-place there is a statue, said to have been executed by Michael Angelo, during one of his visits to the town. The authorship, however, like a great deal ascribed to the great artist is very doubtful.

The average wages paid to the different classes of workmen are as follows: quarrymen, per day, 2*s.* 6*d.*; gangers or foremen, 4*s.*; masons, 2*s.* 9*d.*; sanders, 2*s.* 9*d.*

Of sculptors there are all grades, from the ordinary carver whose services can be obtained for 3*s.* 6*d.* a day to the master in the art — the professor — who has received rewards and decorations from crowned heads, and who is sought after with commission from every part of the world. The quarries are situated in the ravines or gorges which run up between the lofty peaks of the Apennines. At Carrara these mountains are about 1500 feet in height, and from their summits a magnificent view can be obtained of the plain below, and of the Mediterranean in the distance. The white marbles of Carrara are known to the English market as Sicilian, Vein and Statuary. Of these, Sicilian is the most common. The term "Sicilian" is purely English, and is of doubtful origin; it has been asserted that the first cargo brought to England arrived in the good ship "*Sicilia*." More probably, however, the marble is so called because it was formerly shipped to Sicily, and thence to an English port. The Italians call it Bianco Chiaro (clear white). It varies much in color and in texture as it approaches more nearly to the character of Vein on the one hand, or of Dove on the other. The principal quarries are situated in groups known as the quarries of Lorrano, Canal Bianco, Canal Chiosa, La Rattola, and Ravaccione, in the ravine of Ravaccione; of Fantiscritti and Canal Grande, in the ravine known by the latter name; and of Collonata.

The pure appearance of white marble has caused it to be much used in the raising of memorials to the dead. For this purpose Sicilian is chiefly employed. It is, in fact, the only white marble which will bear exposure to the open air. The others are much softer and liable to speedy disintegration if placed out of doors. Very great care is, however, necessary in the selection of Sicilian which will withstand a Northern climate; the best is of a slightly bluish tint, of hard and close texture, of uniform color throughout, and free from decided veins. Vein marble is used for decorative purposes in the interior of buildings; it is of much whiter ground than Sicilian, is softer, and becomes more or less valuable as the veining is more or less fine and regular. The principal quarries are those of the groups known as Vara and Canal Piccola, in Canal Grande, and of Gioja, in Collonata,

Statuary needs no description. It is the most beautiful and most sought-after of all marbles. The great difficulty about it is that a block can be rarely obtained which is pure. The principal quarries are in Ravaccione, near Carrara. The best is of even, white tone, with a slightly yellowish tint. Some of it is of a sugary whiteness, which takes the eye of the inexperienced; but is quite unfit for sculpture. Statuary of this description is soft and easy to work; but is very liable to stains, and rapidly falls into decay. A very beautiful description of Statuary is found near Serravezza. It is much whiter than that of Carrara, but is somewhat coarser in grain, and is, perhaps, on the whole, not so well fitted for the sculptor as the latter. Some of the quarries in Canal Grande and Collonata produce a marble of a dark blue tint with veinings, which are little to be distinguished from the ground color. This variety is known in England as Dove marble. It is very hard, and is little used.

A marble of similar character, but of much greater beauty, is known as Bardillo or Bardiglio. It is found at Serravezza. It is of a pale dove ground traversed by dark veins; sometimes the veining assumes the appearance of flowers, hence the Italian name for it of "Bardiglio fiorito," or "fiorito di Serravezza."

Pavonazzo marble is raised near Carrara. It is of very rich color; the ground varies from a creamy white to a yellowish brown, marked with deep purple veins, with here and there a greenish tinge. It is much used for panellings to walls. When employed for this purpose and used in large masses it has a magnificent appearance.

Siena marble is found near the town of that name, the ancient Sena Julia on the Via Clodia. This marble is of a deep, rich yellow tint, with veinings of purple and black. The quarries do not seem to have been properly opened up. They are so many scratches on the side of the mountains and very few large blocks are produced. In Italy it is usually sold by weight.

The quarries from which black and gold marble is procured are at Porto Venere, near the mouth of the Gulf of Spezia. This marble is sometimes known as "Portor" marble. This is a corruption of the Italian Port d'Oro. The ground is of a rusty black with spots of light brown. The veining is very beautiful, running from white through every shade of yellow to dark brown.

Near the coast between Spezia and Genoa are several quarries of colored marble. At Levonto two varieties are raised — the Rosso and Verde di Levanto. The first is a purplish-red marble; in the latter veins of purple, red and green are mixed and interlaced in a most bewildering manner. At Pietra Lavezzara, near Genoa, the beautiful Genoa-green marble is produced. This marble has a very deep green ground; in places it is almost black. It is filled with veining of a lighter green and white. Another very handsome green marble, known as Verde di Pegli, is found near Genoa, along the course of the Varenna torrent.

A very beautiful serpentine, called Verde di Prato, is quarried near Prato, a small town a few miles from Florence. The ground is of a deep green, with dark spots, and veined with white. It polishes well and is cheap, but it cannot be obtained in large blocks, and it is not the most durable of marbles. A great deal of it has been used in buildings at Florence. It is especially to be noticed in the Cathedral, the Campanile, and the church of S. Maria Novella. In these buildings it has been employed in the exterior walls with alternating courses of white marble and red sandstone. The effect is striking and very beautiful, but much trouble has been caused by the gradual decay of the serpentine. The use of it should be entirely confined to interiors.

There are several quarries of a finely-marked white marble in the hills to the north of Verona, the town immortalized by Shakespeare, in his story of the loves of Romeo and Juliet and the contests between the Montagues and Capulets.

> "Two households, both alike in dignity,
> In fair Verona, where we lay our scene."

The tomb of Juliet is one of the attractions of the place, and it is built of the red Verona marble. This is of a pale pink ground, with veins of red and dashes of gray. It sometimes assumes a brecciated aspect. The marble is not very hard, but it takes a good polish. It has been extensively used in the buildings of Venice. In the palace of the Doges it is found in the columns on the south and west sides; and it has also been employed at St. Mark's, in the Accademia delle Belle Arti, and in several of the Venetian churches.

Near Lago Maggiore there are some quarries of a white marble, which was used in the construction of the beautiful cathedral at Milan. In the same neighborhood, at Baveno, on the shores of the lake, there are some large quarries of a very fine granite; this is principally worked upon the spot, very little being sent away in a rough state.

There are several varieties of Italian alabaster. A very beautiful pure statuary is found in the Val di Marmolago, near Castellina. Another, known as agate alabaster, is quarried near Volterra. A fine clouded variety, called Bardiglio, is also found near this town, which is the seat of the Italian alabaster trade. There is an enormous business done in this material. There is hardly a piece of sculpture of which a model can be obtained, which has not been reproduced by the sculptors of Volterra. So much of it has been turned out in modern times that its value has been sensibly depreciated. It is somewhat fragile, but the beauty of its appearance and the ease with which it can be worked will always keep it in demand.

The stowage of marble, as practised at Leghorn, is raised to the dignity of a fine art. Generations of stevedores have inherited and have improved upon the traditions of their fathers. The loading of the large ocean-going vessels from the small *navicelli* is very smartly done. A floating pontoon crane is brought into play, in which the required power is gained by means of a huge wheel. By this means the heaviest blocks are lifted from the small vessels, and are delivered into the holds of the large craft without difficulty. The cargoes are usually made up with light goods, of which pumice-stone, hemp, oil and sumac form the principal part. Of these, neither hemp nor pumice are sources of trouble, but it is necessary to keep oil and sumac from all contact with marble. Sumac is especially dangerous. It is shipped as a fine floury substance, and in sacks which are never too stout. When sumac dust settles on white marble, the result is not immediately apparent; but if it once becomes wet, or even damp, it becomes a powerful purple dye, which penetrates the marble to an extraordinary depth.

Italian marble is usually shipped and freight paid by measurement, and not by dead weight, twenty-five cubic palms, or about thirteen and one-third cubic feet being reckoned to the ton. The principal market is the American. In one year (1882) there were shipped to the United States and Canada 29,940 tons. During the same year the exports to British ports amounted to 15,760 tons. Belgium, France, Russia and Germany are large importers of Italian marble.

Sawn slabs are principally shipped to England — in fact, this is now almost the only country which admits them duty free. As a consequence, the market price of sawn Italian marble is lower in England than in any other part of the world, except in Italy itself, and sometimes not even with that exception. — *Arthur Lee in Building News.*

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSE OF ROSS WINANS, ESQ., BALTIMORE, MD. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print, issued only with the Imperial and Gelatine Editions.]

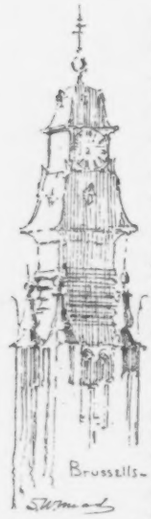
"BREAKING UP OF THE AGAMEMNON." AFTER AN ETCHING BY SEYMOUR HADEN.

FRANCIS SEYMOUR HADEN was born in London in 1818. The son of a distinguished physician, he followed his father's profession, in which he has reached eminence. He etched his first plate in 1843, and has since then produced, in the intervals of his labors as a busy London surgeon, some two hundred plates. Excepting Whistler's, the etchings of no modern artist have gained so much attention as those of Haden, and this although they are the work of an amateur. His most famous plates are "Shere Mill-Pond," "Windsor," "Greenwich," "Erith Marshes" and "Calais Pier" — the last named a large work after Turner. The "Agamemnon" was etched on a July day in 1870, when Mr. Haden went out and drew (on the copper) this moving picture of a fine old man-of-war, as she lay in the Thames opposite Deptford, being broken up. The towers of Greenwich Hospital are on the left, beyond the hull of the "*Dreadnought.*" Hamerton states that some 2,500 guineas was made from the sales of the first state of this plate. The original etching was lent to us by Messrs. F. Keppel & Co., of New York.

HOUSE OF MISS ALICE KEYS, CINCINNATI, O. MR. F. W. STICKNEY, ARCHITECT, LOWELL, MASS.

COMPETITIVE DESIGN FOR THE CARNEGIE FREE LIBRARY, PITTSBURGH, PA. MR. W. HALSEY WOOD, ARCHITECT, NEWARK, N. J.

ON THE THEORY OF THE ABANDONMENT OF ANCIENT LIGHTS.[1]



DURING the course of the last year there has once more been brought before the Court of Appeals an important case,[2] involving the question of the exact meaning of the legal term "abandonment." The following remarks, which have no pretension of representing a scientific inquiry into the subject, aim merely at working out, if possible, in a simple and practicable form, some definite principle which could be applied to the decision of such cases as that above alluded to.

Now, whenever a prescriptive right to light has been acquired in respect of a certain window, the *position* of which, in the original wall, is subsequently altered (by the aperture being either raised or lowered), or the *plane* of which is altered by an alteration in the site and plane of the wall, the first material question is, of course, "to what 'quantum' of light was the owner of the window — the plaintiff, let us say — originally entitled?"

Now the prescriptive right — according to the natural interpretation of the statute[3] — is a right to all the light which has access to the window in question, *i.e.*, to the "general light of the sky"[4] so far as "intercepted," to use the common expression, by the window. It is usual[5] to speak of this as a "*cone*" of light — by which expression is meant presumably the whole volume of light[6] poured (so to speak) through the aperture of the window from all quarters of the area of sky visible from any part of such aperture. What amount of illumination this "cone" would represent in the case of any given window would clearly depend not only on the nature, height, and extent of the obstacles which obscure, or tend to obscure it, but upon the exact nature of the aperture, the amount and quality of the glass (where glass is employed), etc.

But for practical purposes (legal and not scientific), we need hardly consider the matter in so much detail. Starting only with the necessary assumption that all parts of the sky are equally luminous, we proceed to consider what pencils of light from any part of the whole area of the sky fall, at any angle, upon the plane[7] of the particular aperture. Whether the aperture be well or ill glazed, or not glazed at all, does not affect this question, so long as some appreciable quantity of light passes through it.

The statute says nothing about glass; and though the use of this material necessarily involves a waste[8] of a certain quantity of light which would pass through an unglazed aperture, yet it could hardly be maintained that the volume of light which reaches the plane of the aperture (glazed or open) is not in any case "used and enjoyed" in a legal (and practical) sense, so long as the diminution, from any cause, of the light *without* the aperture would always produce a proportionate diminution of the light *within*.

The extent of the intercepted area of sky seems, therefore, the only material thing to be considered.

For a simple example, let us take the case of a square horizontal skylight, set in the centre of a square courtyard surrounded by four walls of equal height, facing (let us suppose) north, south, east, and west respectively.

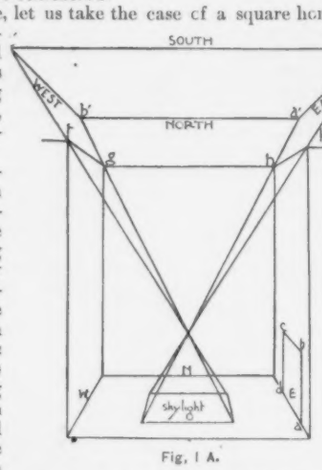


Fig. 1 A.

The base of the inverted pyramid shown in Figure 1 A will accurately represent[9] the required area, being bounded on the north by a straight line, $b'\ a'$, parallel to and in the same plane with (1) the south side of the aperture $a\ b\ c\ d$, viz., $a\ b$, and (2) the line $g\ h$ representing the obscuring horizon on the north side; and similarly on the east side by the line $a'\ d'$, which is parallel to and in the same plane with (1) the line $h\ k$ (the obscuring horizon on the east side), and (2) the line $a\ d$, the west side of the aperture $a\ b\ c\ d$. And similarly with the other sides, so that if we imagine the base of the pyramid to be a visible superficies, and further imagine one of the four sides surrounding the square courtyard removed in order to give us a view of it, the rectangular area of sky represented by the said base would appear, when viewed in perspective from below, in the form of the figure a', b', c', d', in Figure 1 A. It can easily be seen that the figure would be exactly pyramidal only when the dimensions of the aperture and surrounding walls were as assumed above.

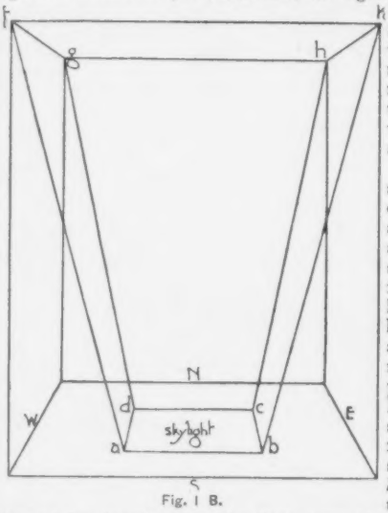
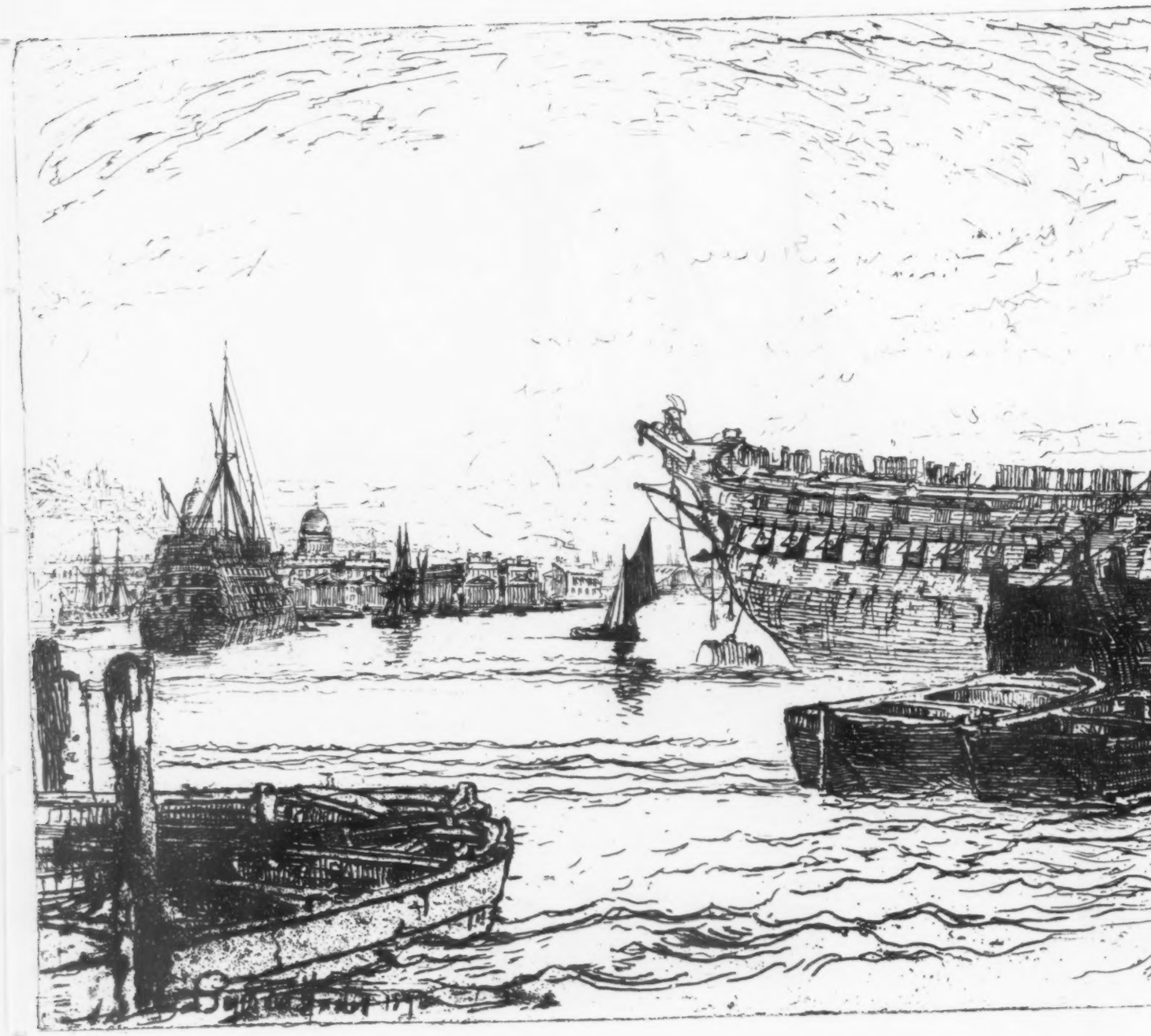


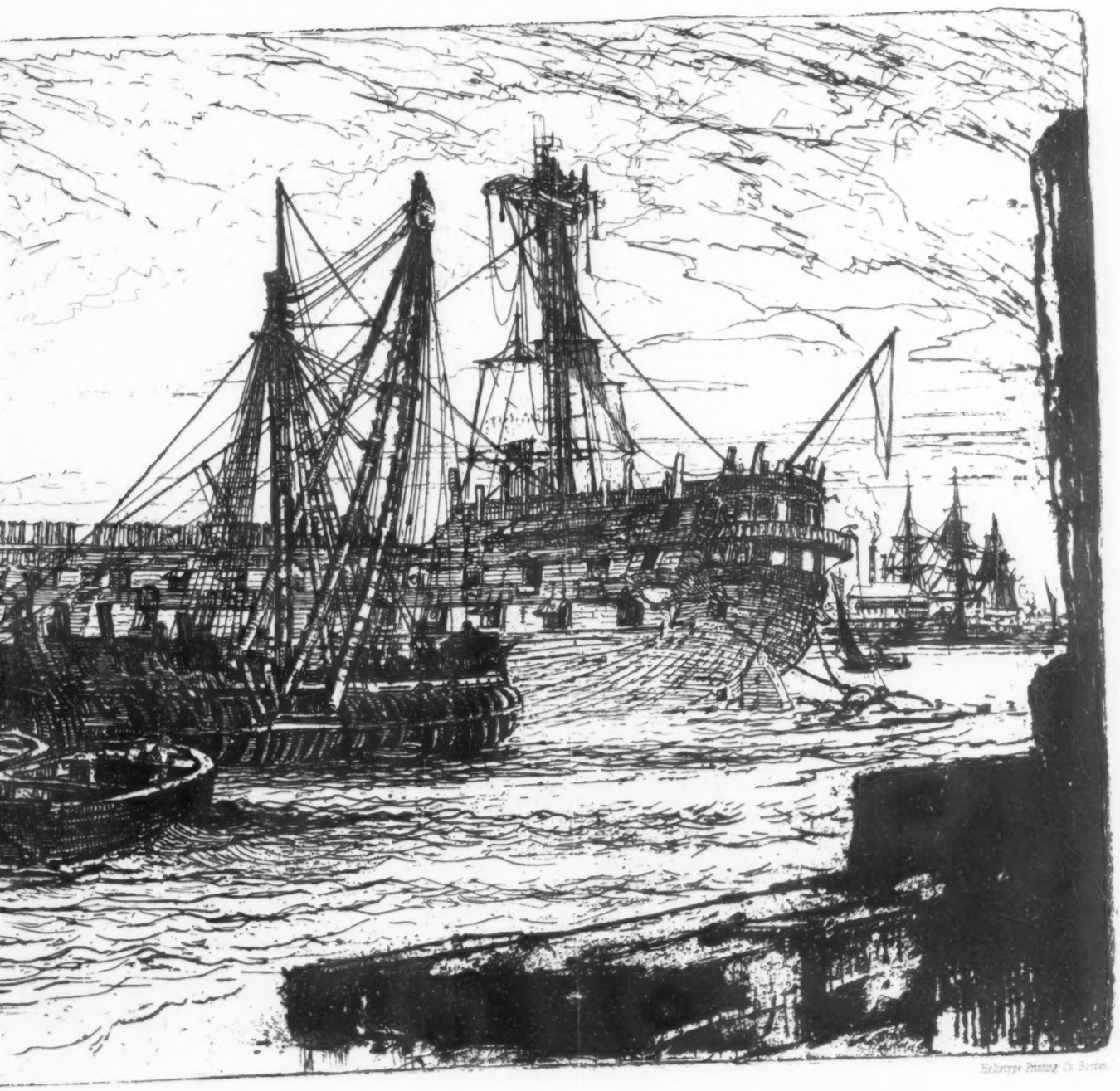
Fig. 1 B.

But if we wish to consider the whole volume of light reaching the aperture $a\ b\ c\ d$ from any part of the aforesaid area of sky, in so far as it is below the level of the obscuring horizons $f\ g$, $g\ h$, $h\ k$, and $k\ f$, this will be represented not by any part of the pyramid in Figure 1 A, but by the six-sided figures having for opposite sides the squares $a\ b\ c\ d$ and $f\ g\ h\ k$, shown (in perspective) in Figure 1 B, and formed by drawing straight lines from the points $a\ b\ c\ d$ to the points $f\ k\ h\ g$ respectively. It will be seen that the apex of the pyramid in Figure 1 A would fall within this figure, also that supposing the straight lines $a\ f$, $d\ g$, $c\ h$, and $b\ k$, were produced to any distance, the side $f\ g\ h\ k$ would always fall within the base of the pyramid. Thus the upper side of the figure shown in figure 1 A (were the figures produced to any length) would never represent

[1] A paper by George H. Powell, Barrister-at-law, published in the *Builder*.
[2] Scott *v.* Pape, reported in 31 Ch. D., 566.
[3] 2 and 3 Wm. IV., c 71 (1882), s. 3.
[4] Homersham Cox on "Ancient Lights."
[5] See judgments and arguments in the case cited above, and in Ancient Light cases, *passim*.
[6] It will be observed that "direct" light alone is here considered, for the following reasons: — (1) That it may (it is submitted) be assumed, with sufficient nicety for practical purposes, that the amount of *reflected* light would vary, *ceteris paribus*, as the amount of direct light: and (2) there seems no ground for supposing that a right could be acquired to "reflected" as distinct from "direct" rays or pencils, or that the mere alteration by the owner of the servient tenement of the reflecting properties of its surface, could form the subject of an action at law.
[7] Which is assumed, in the following argument, to which, however, the point is immaterial, to be the same plane as that of the surface of the wall in which it is set.
[8] For the scientific expression of this, and the trigonometrical measurements of the illumination and obscuration of a glazed window, see the "Optics of Ancient Lights" in Mr. Homersham Cox's work on the subject.
[9] For whatever be supposed to be the surface of the area or arc of sky from which the light is (*ex hyp.*) derived in the first instance, every part of that area must be included in the τέμενος represented at any given altitude by the plane figure $a'\ b'\ c'\ d'$, as viewed from any point within $a\ b\ c\ d$.



The Breaking up of the Agamemn



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amemnon. —— Seymour Haden.

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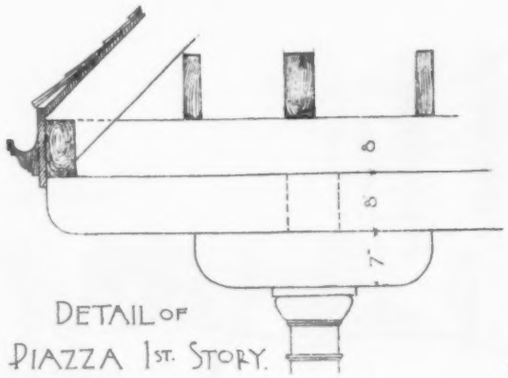
FIRST STORY



DETAIL OF
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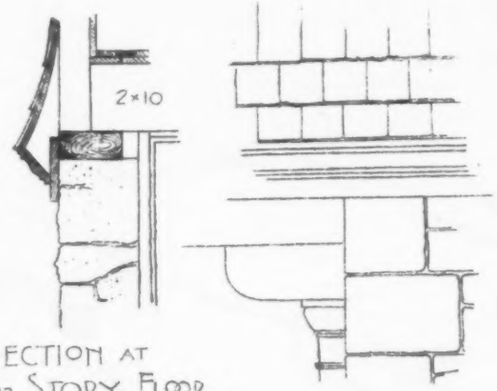
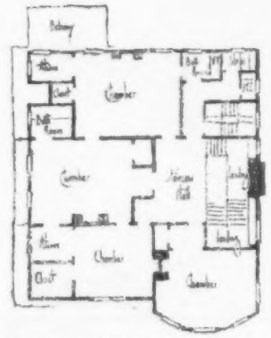
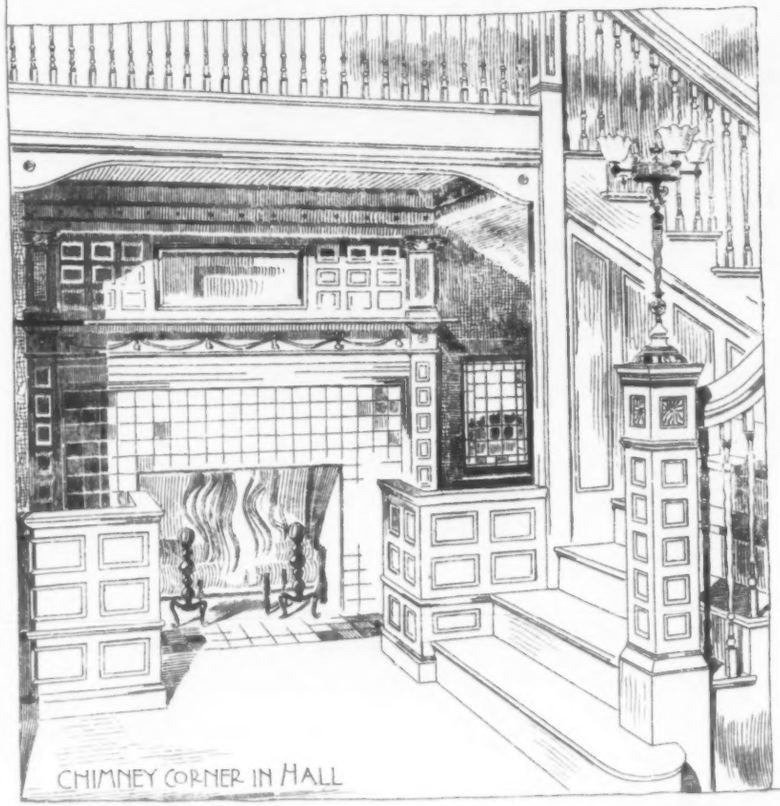


SECTION AT
2ND STORY. FLOOR.



SECOND STORY



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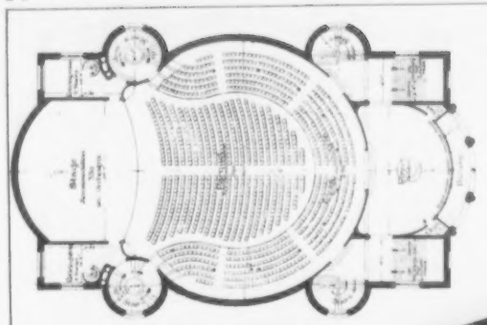
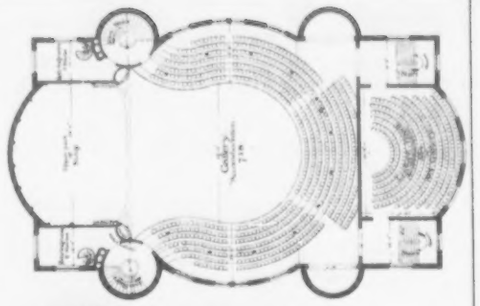
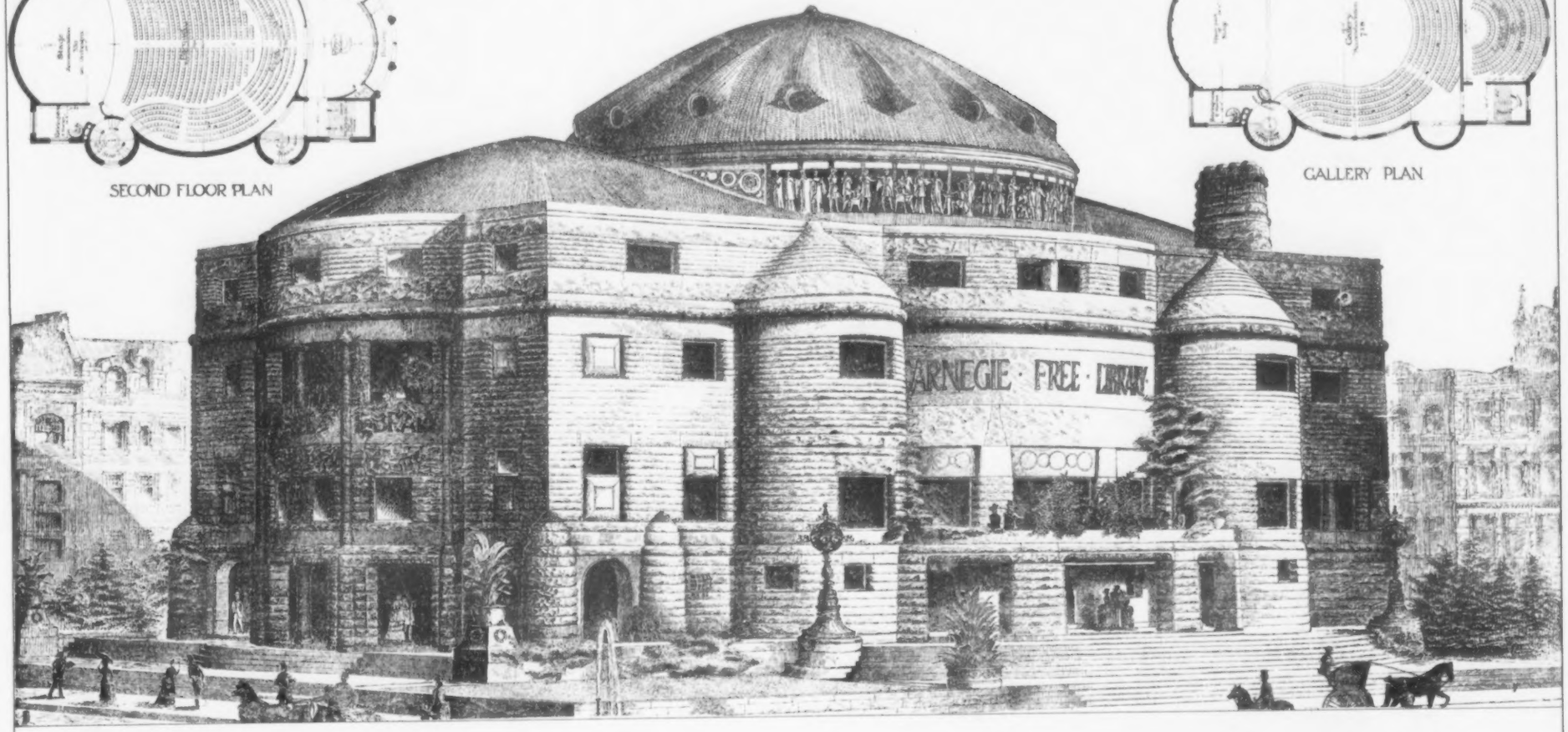
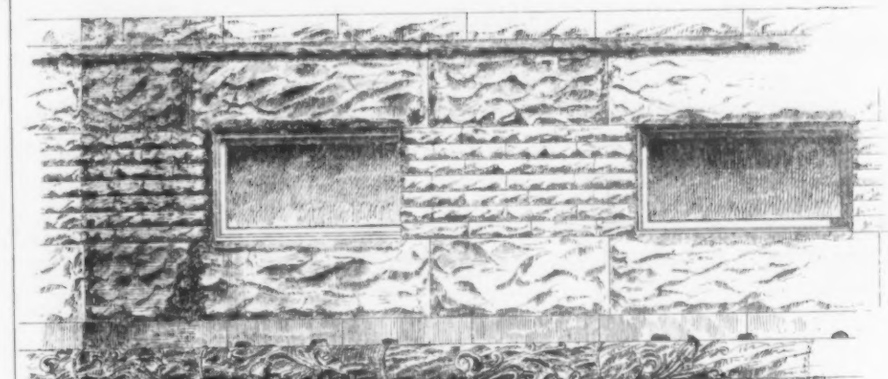


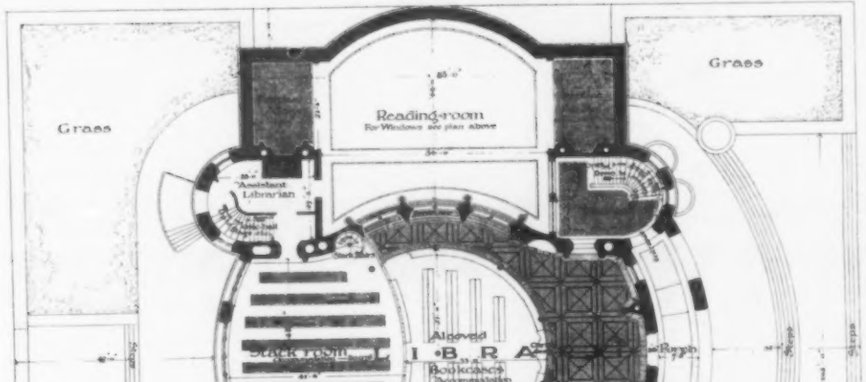
SECOND FLOOR PLAN

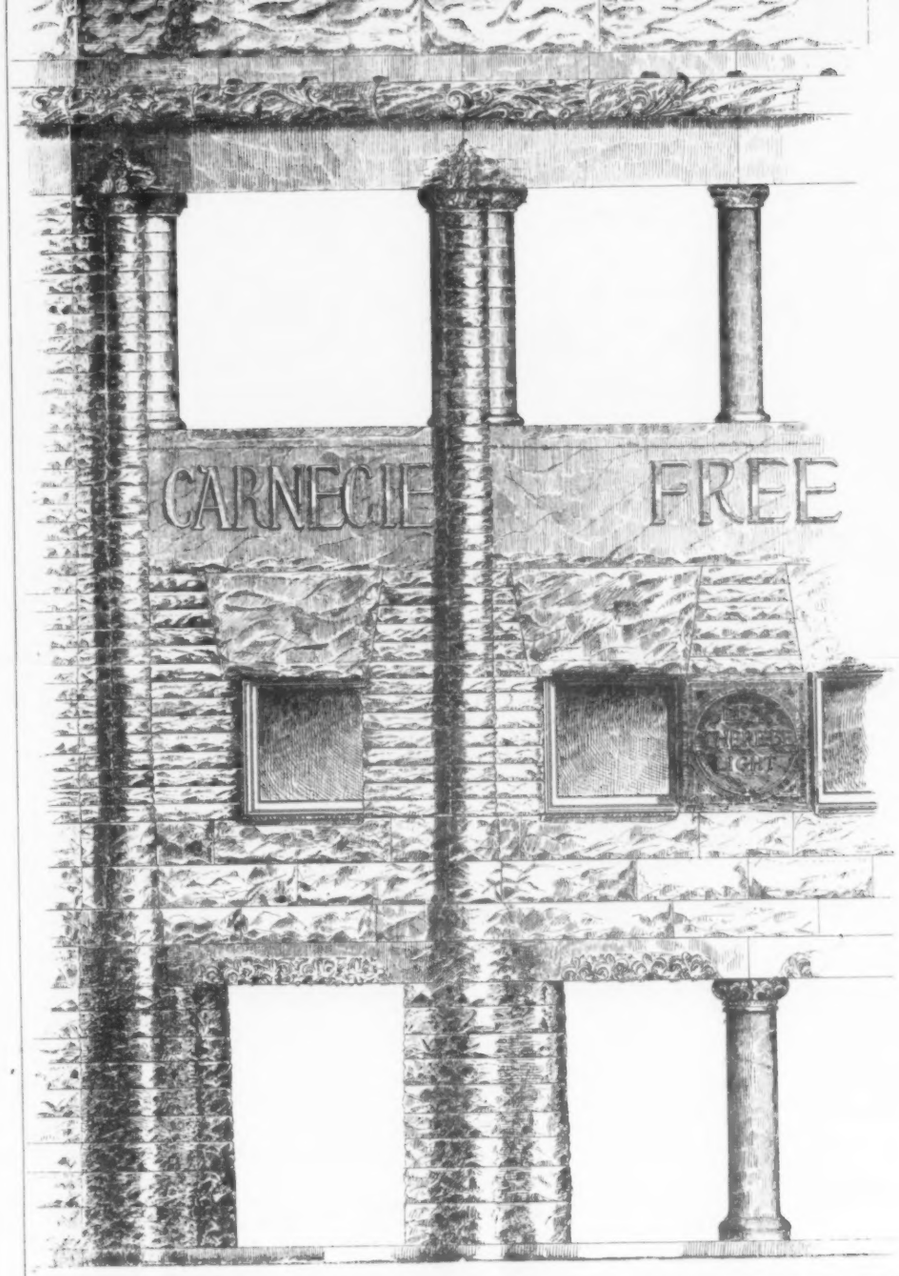


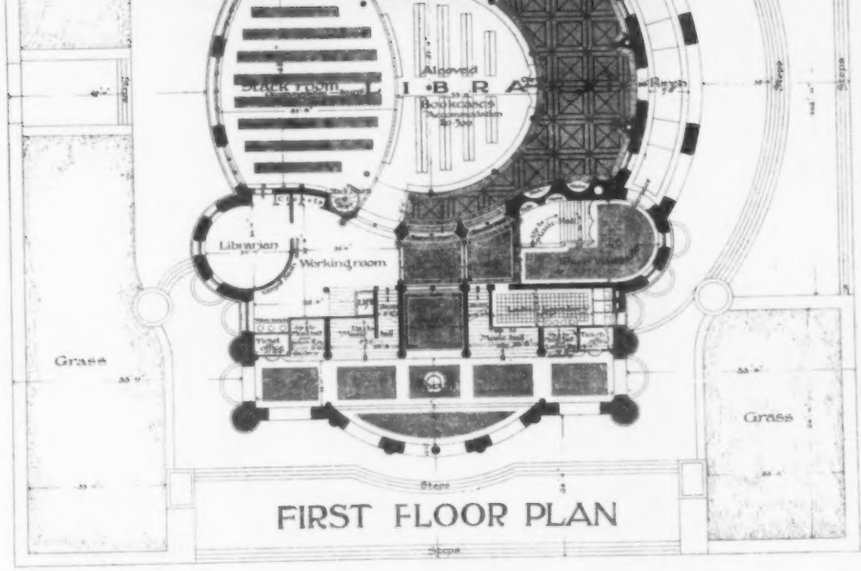
GALLERY PLAN





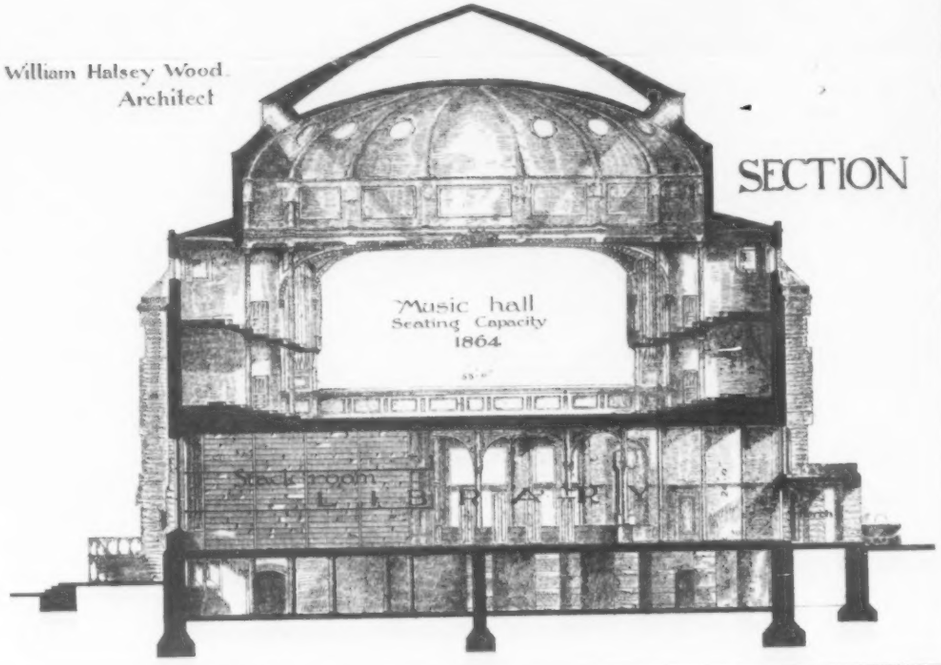






FIRST FLOOR PLAN

William Halsey Wood
Architect



SECTION

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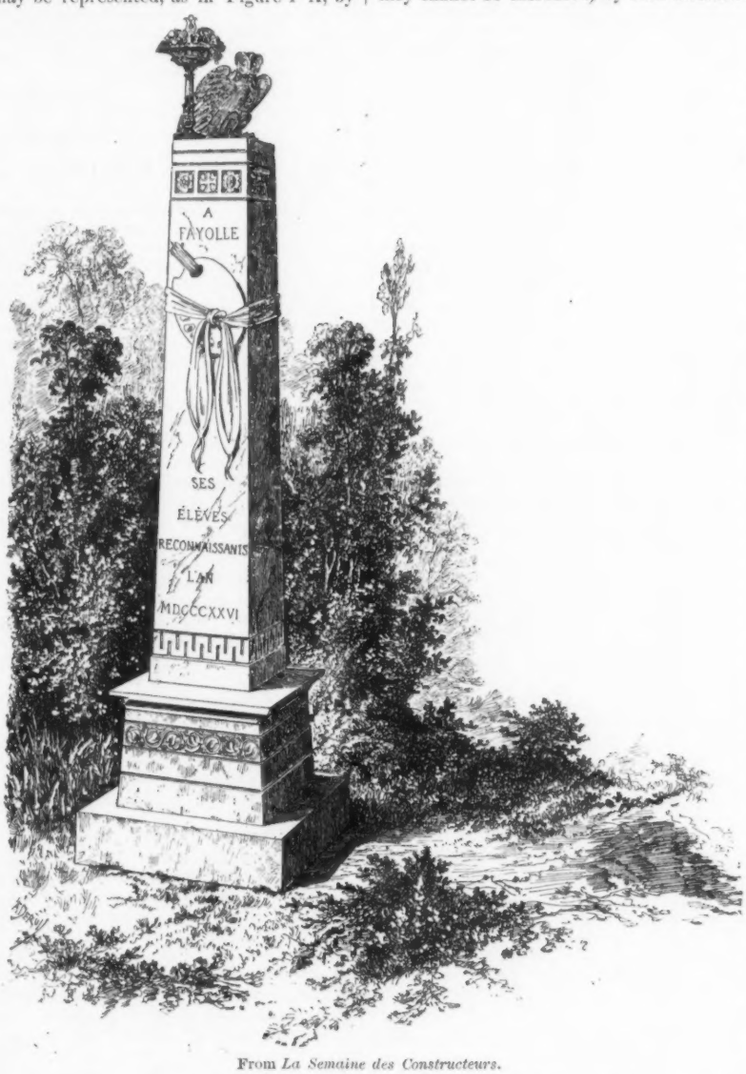
the area of sky intercepted by the aperture *a b c d*. But, as has been said, Figure 1 A shows this area of sky, represented by the base (*a′ b′ c′ d′*) of the pyramid; whereas Figure 1 B shows the "channel"[1] so to speak, through which all direct light must travel, below the level of the obscuring horizon, to reach the aperture *a b c d*. It is important to observe this, merely because the sides of this figure *a f g d*, *d g h c*, *c h k b*, and *b k f a*, represent the planes beyond which the buildings on the west, northeast, and south sides of the aperture respectively cannot be advanced without obstructing the passage of the light at present intercepted by it.

The base of the pyramid (Fig. 1 A) representing, as has been said, the area of sky from some part or the other of which all the light that reaches the aperture *a b c d* must come, the directions of the various pencils of light must clearly cross one another at various points within the figure representing the volume of light below the level of the obscuring horizon shown in Figure 1 B. The apex of the inverted pyramid (Fig. 1 A), a point some distance above the surface *a b c d*, will be the point where the pencils of light from the extremities (north, south, east, and west) of the intercepted area of the sky *a′ b′ c′ d′* intersect one another.

It will be seen, moreover, that the pencils of light from the extreme northeast, northwest, southeast and southwest points respectively of the area *a′ b′ c′ d′* will be intercepted at the extreme southwest, southeast, northwest, and northeast points of the aperture *a b c d* respectively, and may be represented, as in Figure 1 A, by the lines *a′ a*, *b′ b*, *d′ d*, and *c′ c* respectively. The case of a horizontal skylight in the position above described is only here referred to because it affords, perhaps, the simplest illustration of the principles involved. Moreover, it can be easily seen from this illustration (as represented in the sketch) what would be the effect of moving the position of the aperture *a b c d* (for example) in a direction due east. It is clear that the area of sky would be extended on the west and proportionally diminished on the east side, while its breadth from north to south would remain unaltered. Suppose the aperture to be moved in the east direction till its side *c b* falls on the base of the wall *h k;* then suppose its movement continued upwards in a plane at right angles to the horizontal (in which it was originally), and for the skylight we now have a window,[2] of the same size and shape in the wall on the east side. What is the effect of this change of plane upon the sky-area intercepted? In the first place, that area has been reduced on the east side, since the side *a d* (now the lower side of the window *a b d c*) has moved a considerable distance eastward, and, therefore, the line *a′ d′* (which, as explained above, must always be in the same plane with and parallel to the lines *h k* and *a d*) must have moved westward, and would now (*a d*, as has been said, being in the plane of the wall) be in the plane of the wall produced. In the second place, the sky area will have been extended in a westward direction, since, in proportion as the line *c b* advances in one direction the line *c′ b′* will have advanced in the other. Meanwhile the breadth of the sky-area from north to south will have been enlarged. In the simple case first considered the intercepted "sky-area" would be represented by the base of an inverted pyramid. In the case of a window the intercepted area would be represented by the base of an irregular figure to some extent resembling a pyramid and having as many triangular sides as there were different planes in the obscuring horizons. But the extent of the said area in any given direction could clearly be estimated on the principles applied above.



From *La Semaine des Constructeurs.*

For instance, let *a b* in Figure 2 represent a window in a vertical plane placed in a wall facing south (viewed in section), and *g* the obscuring horizon on the south side. The sectional area of sky intercepted from *a b* will clearly be bounded on the north side at the point *c* in the plane of the wall produced, and on the south side at the point *d* in the line *a g d;* and consequently the line *c d* may be taken to represent the sectional area intercepted from north to south, by the window *a b*. Supposing there were other obscuring horizons on the east and west, southeast and southwest, or any other quarter, to be considered, figures could be drawn similar to the above (Fig. 2), showing the sectional area that would be intercepted in a plane at right angles, or in a plane at any angle (according to the position of the obscuring horizon) to the plane of *c d*.

Having reminded the reader of the above principles, we pass on (still considering, for the sake of simplicity, the sectional area intercepted by the window in one plane only) to inquire what the law provides in the case when either the position of the window in the wall, or the plane of the wall itself, is altered. To what extent are the supposed plaintiff's rights affected or impaired (for, of course, they cannot be increased) by such alterations? Let us suppose the plaintiff has acquired a prescriptive right to the access of light to the window *a b* (Fig. 3), the obscuring horizon of the servient tenement being represented by the point *g*. Then let the plaintiff's wall be advanced from the position X to the position Y. Now, in considering exactly what is meant by "abandonment," we may begin by observing that the mere advance of the plaintiff's wall from the plane X to the plane Y will, of necessity, deprive him of the enjoyment of a considerable quantity of light which he before enjoyed, viz., of all the direct light coming from the sectional area of sky, *h l*. But inasmuch as this deprivation is entirely due to the plaintiff's own act (and could not in the nature of things affect the rights of the defendant, the owner of the servient tenement), we may dismiss it from consideration. The only "abandonment" which it is necessary to discuss may be defined as the relinquishing by the plaintiff of some right which restricted the defendant in the enjoyment of his property. In fact, if we say that whatever acquired right the plaintiff intentionally ceases to enjoy, constitutes a corresponding restoration of or addition to the rights of the defendant, this statement will only require to be modified by the legal maxim, "*De minimis non curat lex.*"

Now, for the legal answer to the question propounded above, we need refer no further back than to the afore-mentioned case of Scott *v.* Pape,[3] in which the most important decisions on the subject are reviewed. The legal right is there stated to be retained in respect of a new window, "*which includes in its area a substantial part of that of the original window, i. e.*, which if the new wall were laid upon the old wall so that their bases coincided, would *substantially coincide with the old window.* Dozens of judicial expositions of this principle

[1] When regarded as a *solid figure*, it represents the volume (see above), the whole volume of light reaching the aperture.

[2] Represented by the part shaded dark in the Figure 1 A.

[3] See Ap., 560; also the recent decision of Newson *v.* Pender, reported 27 Ch. Div., 43; or see recent text-books *passim*, — Shirley's "Leading Cases in Com. Law," p. 238 (1883 edition).

might be cited, were it not well known to be supported by all authority. So long as there is a preservation of a material part of the old aperture so long there is no abandonment of the right, and if there is no preservation of any material part of the old aperture, the right is understood to be abandoned, and therefore lost. This is a perfectly plain and simple principle, and in accordance with it the plaintiff in the aforesaid case of Scott *v.* Pape [1] (decided in February, 1886) did not venture to ask for relief (in the form of an injunction) with respect to those of his new windows (his building having been advanced towards the servient tenement) which could *not* be proved to "correspond" with ancient lights in the original building.

But the various declarations of the law on the subject seem to suggest, in conjunction with the above, another and a different theory, which has only been imperfectly developed. We find it authoritatively stated [2] that if the plaintiff continues to use, through his new apertures, "the same, or substantially the same cone of light" which he enjoyed before, then there is no legal abandonment.[3]

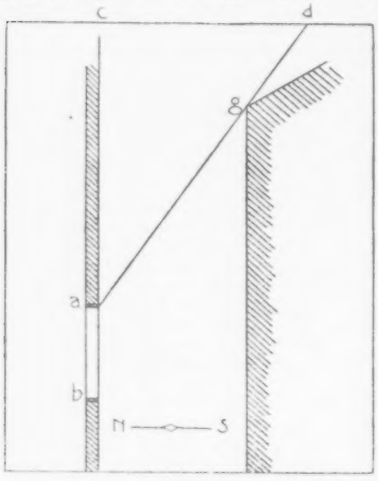


Fig. 2.

In another place [4] the prescription stated is defined as the right "to have arrive for the use of your house" the pencils of light "which, during the twenty years passed through the original aperture," to have "the space within [5] lighted in the same manner" in which it was lighted through the old windows. At the same time, "structural identity" is not, we are told, "the test." The measure of the enjoyment is not the aperture itself, but "the size and dimensions of an aperture in that position" (*scil.* that of the original window). To apply these principles of law to the case supposed (see Fig. 3), the sectional area of the sky, intercepted by the original window *a b*, will be represented by the line *k-a'*. It is clear that there will be pencils of light from the extremity *a'* of this area passing along the line *a a'* through the aperture *a b* to *o*, some object within.

Now, if in the new wall a window, *e f* (in exactly the same position, relatively, as *a b*), be substituted for the original window, there will be, according to the first principal stated above, no abandonment at all; for the window, *e f*, not only substantially, but exactly coincides with the original window, *a b*. But it is clear that no pencils of light from the point *a'*, or, indeed, from any point of the sky-area between *e'* and *a'* can possibly "arrive" at *e f*, and that the "space within" is therefore not (in any ordinary sense of the words) lighted "in the same manner" as before. In fact, no direct light arriving from any point of the sky-area between the points *e' a'* can possibly reach any window placed below the point *e*. But if the access of light which was enjoyed before is now no longer enjoyed, surely it has been in fact and in law abandoned? Conversely, it is obvious that if the plaintiff, having acquired the supposed rights in respect of the window *a b*, wishes to continue in the enjoyment of these rights in so far as is compatible with the alteration in the plane of his wall, far from placing his new window in the position (*e j*) of the old one, he must raise it to the position *c d* (the point *d* being supposed to be in a straight line with the points *g* and *b*). If he puts his new window in any position lower than this, he will, in fact (if not in law), be ceasing, to a greater or less extent, to enjoy the access of light, to the enjoyment of which he has acquired a right. Is it possible, then, to follow such clear enunciations of the law as are quoted above with regard to "pencils of light," "cones of light," etc. (the only sensible interpretation of which points to the above conclusion), and, at the same time, carry to its logical results the principle which seems to attach such a magical importance to identity of position — in fact, to a fictitious "correspondence" between the old and new windows? Suppose, for example (in Fig. 3), the window *c d* were the original window, intercepting the area of sky, *l a'*, and the plane of the wall were moved from X to Y (*i. e.*, retired from the servient tenement). If for the original window *c d* a new window, *a b*, were substituted, then, according to all authority, the rights acquired in respect of *c d* would be "abandoned," notwithstanding that, as a matter of fact, the same pencils (to a considerable extent) pass through *c d* as passed through *a b*, and this could not be the case with a window in the position *e f*. Why then is the latter said to be lighted "in the same manner" as *a b*? Again, supposing *e f* to be the "original" window intercepting the area of sky *l e'*, and the wall (Y) to be pulled down and rebuilt in the same plane, the only alteration in the building being a substitution of a window *c d* for the original window *e f*, according to the principles of law at present applied, the plaintiff has "abandoned" the right he had (*ex hypothesi*) acquired in respect of the window *e f*. Yet all the area of sky intercepted by the aperture *e f*, and a good deal more,[6] is still intercepted by the aperture *c d*.

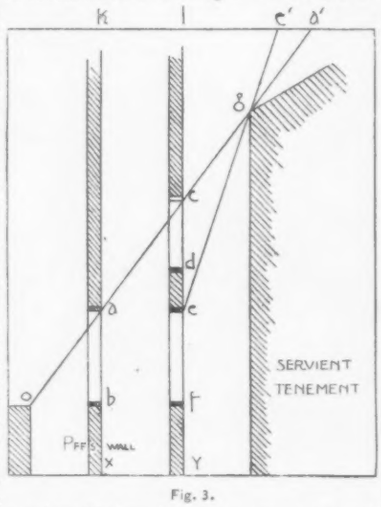


Fig. 3.

[To be continued.]

[1] See p. 556 of the Report in 31 Ch. Div.

[2] *E. g.*, per Cotton, L.J., 31 Ch. Div., p. 570; and see the cases cited.

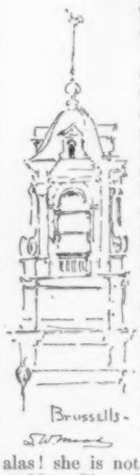
[3] Of the meaning of this language we have spoken above. It has been already submitted that the material points to consider are not so much the form in which the light is thrown into the building, lessened or not by refraction, but (1) the "volume" of light (below the level of the obscuring horizon) which illuminates the plane of the aperture (glazed or otherwise); and (2) the area of sky from which the pencils of light constituting that volume are derived.

[4] See remarks of Bowen, L.J., 31 Ch. Div., pp. 572-4.

[5] *Ib.*, per North, J., whose decision was affirmed by the Superior Court.

[6] But this, the enjoyment *pro tem.* of more than he had a prescriptive right to, has (since the decision of Tapling *v.* Jones, reported 11 House of Lords Cases p. 260) no prejudicial effect on his existing rights. Probably it would never have occurred to any but a legal mind to maintain the contrary, which was equivalent to arguing that the owner of a right of way should lose that right if he trespassed in his neighbor's field; but, if possible, more absurd, since the plaintiff's action (in the case of light) could hardly, by any stretch of language, be described as a trespass.

SOME FOREIGN PICTURES IN LONDON.



THE French Société des Aquarellistes has done us a good turn in sending some of its members' works over to our grimy city. *Je vous salue, messieurs et mesdames, et je vous remercie!* At last I can say to my compatriots, "There, go and *see for yourselves* what French water-colorists can do!" for, in season and out of season, for years past, have I been sounding the merits of French water-colors, and to what effect? In books, in magazines, as prologues to catalogues, and epilogues to conversation, I always see and hear that "England is the home of water-color painting; that out of England it does not exist; and that whatever we are in other branches of art, in this we are unique and stand alone" — or rather, STAND ALONE, for only capitals can explain in print the satisfaction with which the true Briton enunciates this dogma. But is it so? There are societies enough here, and exhibitions enough, and painters enough — or too many; but is there a member of either the Royal Society, or the Royal Institute, or the un-Royal Dudley, who can wash in a little bit of landscape better, or as well, as the scrap of Venice on one of M. Escalier's fans? Yes, there is one who could, perhaps, but alas! she is not English, and, if I mistake not, is foreign trained, — Miss Clara Montalba. And there is one man here, too, who could equal the figure-painting of M. Maurice Leloir, viz.: Mr. Alma-Tadema; but he, too, is a foreigner. Water-color as it was practised years ago by Turner and De Winst, pure water-color, rapidly and firmly washed, does not exist. There are stippled water-colors, and sloppy water-colors, and papery water-colors, and woolly water-colors, and body-color water-colors; but for the pure art, well rendered, you must go to France or Italy. We have many imitators; but they are worse than the body-color people, for with opaque color it is possible to correct faults; whereas, dashing in color in the wrong place is a fatal deed. These Frenchmen know how to draw —indeed they are mostly and first painters in oil-color; consequently they know exactly what they want to do, and do it. Perhaps their success is a proof of one of my theories, that a painter in oil can soon work as well in water-color; but an aquarellist cannot work in oil without much practice.

Again I must say, "*Je vous salue, mesdames et messieurs, et je vous fais mes compliments.*"

Your show is excellent, with few exceptions. M. Détaille's soldiers seem to me somewhat harder in execution and blacker than heretofore; but what masterly drawings! Compare them with some military studies in the *Graphic* of late. Then a word of praise for the delicious *washes* of Venice and parts of the south of France, by M. Béthune. How slight they are, how solid and how well drawn! I lately saw some sketches of the Norfolk Broads, in Bond Street, by Mr. Fahey, but unlike these Venice ones of M. Béthune, they are hard and papery; and yet there is no more paint on the Frenchman's work than on the Englishman's, and both are equally transparent.

Mme. M. Lemaire's flowers are even better than they used to be, and her quaint little procession of school-girls, in the costume of the first Republic, is most charming.

Another painter of water who is always excellent in his effects of haze, is M. Courant. Some boats with all sail set, on a dead-calm sea at sunset, with that peculiar effect of pink and green sky one sees in hot weather, is one of the gems of the exhibition. M. Cuvillon stipples too much for my taste: I prefer the work of M. Escalier. His *petite femme* in rose-colored garment, playing with a parroquet, is most refined in treatment. And note that so many of these works have no background; are not in effect pictures, beyond the principal subject. This, again, we never see in our galleries. Such work is considered sketchy; but why not exhibit sketches? Besides, a little figure like this and a parroquet is enough for a picture. Why not leave the background vague? If it had surroundings of a wall or of a room, it would not be half so effective. M. Gilbert continues his flower-stall subjects, in rain and in sunshine. M. Duez is not well represented, and I do not care for the art of M. Dubufe, *fils;* there is a false sentimentality about it. M. Leloir is interesting and idyllic as ever; but how one misses his brother Louis! M. Raffaëlli, too, is not here, though some of his school appear: M. Besnard, for instance, has many sketches which are all they should be — charming little bits of interior and landscapes, and odd corners of the Riviera; true *impressions* in the right sense of the term. But his mystic women, vapory as the background, are mere affected follies. Yet even in these, two studies of heads show him to be a fine colorist; then why give way to eccentric affectations? He cannot pretend that there is anything in nature like his "Madeleine!" It is refreshing to turn to M. Adan, whose work is always of the best, even though he still keeps us on the "terrace." I miss another friend, whom I should have preferred to welcome (M. Heilbutte) to M. Vibert, whose comic cardinals, I confess, annoy me somewhat.

Another foreigner, your countryman, Mr. Bridgman, has a large collection of admirable studies on view at the Fine Art Society's gallery. A true Briton's remark I overheard at Goupil's rather amused me, believing, as I do, that fifty years hence you will have quite outstripped us in all arts as well as literature, because *you go to the best schools for instruction*, whereas *we mostly are content with our own ways*. I do not know if you have any term for "true Briton" or "Chauvin," but I presume the feeling must exist to some extent, and so you must have a term for it. But nothing equals the "true Briton"; even the "Chauvinisme" of Victor Hugo barely reached it. Here is the specimen: "Oh, but they only give enormous sums for pictures for the sake of selling them again. The Americans know nothing of art." This from an inhabitant of the *only* city which keeps alive a Doré gallery! I longed to suggest to this good citizen that half the best pictures painted during the last twenty years had gone to America — but then, of course, they are only French pictures! I envy Mr. Bridgman his color, his facility, his draughtsmanship; and, unlike some of his critics, I prefer him to his master, M. Gérôme. Of the finished pictures I will not speak, as they are not equal to many I have seen by this painter; but the sketches are most excellent, whether they be horses, mules, figures, bits of courtyard or landscape. Sunlight was never better rendered, nor cold gray walls. But Mr. Bridgman, again, is French taught. Still, I believe those who live fifty years will see a great school of painting in the United States, founded on that of France. It takes a long while for a young country to rise to a high level in the arts; but that it is wise to take a leaf out of the book of the best of the old countries' school, there can be no doubt. Any one looking at the display of native talent from our colonies, exhibited at South Kensington last summer, and comparing it with your younger men — Bridgman, Thompson, Pierce and others, who exhibit at the *Salon*, cannot fail to endorse this fact.

A word in conclusion in praise of Mr. Murray's Picardy sketches, though I do not think they do that part of la belle France justice. They give us all the beautiful gray-greens, but they are somewhat monotonous and wanting in sunlight.

PENGUIN.

HUGHES'S SYSTEM OF SANITATION.

THE system of centre-shaft ventilation, thought out by Mr. W. B. Hughes, architect, of Tunbridge Wells, is chiefly applicable to terraces or buildings erected on the block system, where, to economize space, it obviates the necessity of long, useless corridors, to give access to an outside wall, in accordance with the usual practice. This system is, however, unfortunately opposed to the conditions and by-laws of local authorities, which stipulate that all water-closets shall be built against the outside walls. In Mr. Hughes's opinion, the most perfect system of ventilation is that to be obtained by a shaft or open space extending from the basement to the roof of a house.

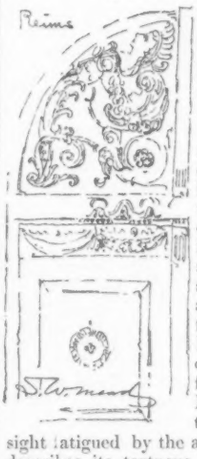
In a block of attached houses, all except the two outside can have but two external walls, viz., the front and the back; and, as a rule, the architect, in planning his building, is desirous of utilizing both walls for the convenience of the rooms, which enables him to place the staircase in the centre of the house, lighted by a skylight at the top, which sheds light down the well-hole. The difficulty here comes in of providing the necessary closet accommodation without taking off a long passage from one of these rooms. To obviate this, and simplify the matter, it is proposed to appropriate four feet of the half-pace landing on each floor for closets, lavatories, etc. These several closets on the different floors diminish in length from the bottom upwards, to the extent of about twelve inches on each floor, admitting of a top-light opening into a shaft from the bottom of the building to the top. The bottom of the shaft on the ground-floor is open to the basement, affording a powerful exhaust for the vitiated air and the offensive smells usually generated in the kitchens and domestic apartments. This arrangement also affords easy access to the water and other pipes, at the same time preventing any possibility of their being affected by frost, while they are easily accessible in case of leakage, which frequently causes great damage during severe weather. In the usual arrangement of water-closets, placed against an outside wall, however much the windows may be opened, in fact, probably all the more when they are opened, because they afford admission for the colder outside air, it is noticed that the vitiated and offensive air is drawn into the house, owing to the higher temperature of the air inside, especially when fires are burning. Place them, however, in connection with a central air-shaft with a constantly-ascending current, and all offensive smell will be drawn off clear of the rooms. The naturally-ascending current is intensified by carrying up the shaft the hot-water pipes in connection with the circulation. It is also suggested that the fresh air from the front and back of the house be brought in through the party-wall to each closet, thus affording a direct current of fresh air, which is dispersed without draught through the centre of the house.

Mr. Hughes has ventilated two churches, erected in the suburbs of London, in which fresh air is admitted at each of the aisle windows, entering at the floor-level and dispersing itself through the sills of the windows, thus affording an unbroken upward current, the intensity depending on the fact that, the higher the temperature within the building the greater is the velocity of ingress. A second advantage consists in there being no unsightly provision for ventilation, as is too often the case, while a direct drain is provided for the water of condensation that runs down the windows. Exits for the vitiated air are also provided in the east and west apices of the gables, by means of a six-inch siphon-exhaust, which carries off the heated and vitiated air at the highest part of the roof.

Mr. Hughes is of opinion that an imperfect system of ventilation is the primary cause of defective acoustic properties in buildings, even more so than the arrangement and proportions of the structure itself. Indeed, it often happens that, in an old, ill-ventilated building, the ventilation ingress is confined to two or three points instead of being equally distributed, as it should be. For instance, if the ventilation-inlet be placed at the end of a building opposite the speaker, the sound of his voice must be obstructed and impeded through having to meet the air-current, whereas, if the voice proceeds in the direction of the ventilation, it is carried easily and uninterruptedly to the hearers. This is obvious from the fact that a sound is wafted on the breeze for a long distance, whereas it is exceedingly difficult to make one's self heard when speaking against the wind.

J. W. P.

A SUBMERGED MEXICAN VILLAGE.



ONE of the most remarkable of lakes is the Laguna de Tequezquitengo, in the Mexican State of Morelos. It is a beautiful sheet, and has every appearance of being a natural body of water, but, nevertheless, it is artificial and of comparatively recent date. It lies in the depths of a valley about two miles long and a little less in width. A Mexican gentleman who visited the spot — which is remote from the ordinary lines of travel, in the district of Juarez — has written an account of the place, which has been reproduced in the July collection of monthly reports, issued by the Secretary of Public Works, giving statistics and information about agriculture and industries, including the geographical features of the country. The writer (Mr. Eugenio de J. Caños), says: "When, in one of the torrid days of May, the traveller who, for the first time makes the journey from Puente de Ixtla to Jojutla by the Tequezquitengo Road feels oppressed by the fiery sun, his sight fatigued by the aridity of the hills, among which the highway describes its tortuous curves, and whose dry, dust-covered vegetation inspires only weariness and discouragement; when he vainly seeks to penetrate the veil with which the hazy air limits the horizon on all sides, and longing for a drop of water to moisten his parched and thirsty lips, how grateful, how limpid, poetic, smiling, and fresh is the aspect when suddenly there appears at his feet, in the depths of that topographical depression, the beautiful artificial lake of Tequezquitengo!

"The crystalline aspect of its limited surface is like that of the clearest mirror. Around the lake all is verdure and freshness; beyond, the land is dry, hot, dusty and sad of aspect. The contrast, perhaps, heightens the beauty of the lake.

"What strange creatures are those, seeking, in the water, a refuge from the burning rays of the sun? They are carabaos, beasts of burden, indigenous to the Philippine Islands and imported by the Señores Morro, former owners of the hacienda de San José Vista Hermoso, one of the largest sugar estates in Morelos, within whose limits lies the lake; these carabaos were imported for use on the place. But it appears they were not of the anticipated utility, for they have been abandoned as working animals.

"But there, almost in the midst of the lake, is something which at first glance is seen to be inanimate; it remains motionless, and but for its rigid immobility it might be suspected to be a gigantic aquatic fowl about to spread white and immense wings.

"Descending by the slope of the almost oval basin, in whose depths lies the lake, it is seen that the object penetrates far beneath the surface, that it increases in size, and when one reaches the margin of the liquid element it assumes its correct shape; it is a church! The strange thing which was seen from afar is the cupola of the tower, crowned by a cross. Now may be distinguished perfectly, within the liquid mass, which has a crystalline transparency, the body of the church, its roof, the main portal, the window of the choir, the belfry openings — all as in a phantasmagoric diorama, whose lens is the surface of the serene lake!

"But how is it that it is an artificial lake? our readers will ask. Who made it, and why? How came the church to be there? What is, or what was Tequezquitengo? We will proceed to satisfy, as well as we may, their curiosity, by relating the history of the lake as we heard it from the mouth of some friends living in the neighborhood, as we stood on the margin of Tequezquitengo several years ago.

"Forty years have passed since there nestled in the bottom of the valley the pretty village of Tequezquitengo, where bull-fights and cocking-mains took place on the occasion of the festival annually held in honor of the saint of the place by its natives and their neighbors. Besides the raising of grain and vegetables, the cultivation of fruit and the breeding of cattle, the principal resource of the inhabitants consisted in the collection of tequezquite, as they call an impure sesquicarbonate of soda, produced in abundant efflorence in the lowest part of the little valley, where the rains, alternately collecting and evaporating, formed a little lagoon. On the margin of this, as it dried, the material was found.

"The neighboring hacienda of San José, a beautiful estate, conducts the water for the irrigation of its sugar-cane fields by an aqueduct of six or seven leagues in length. This water is of considerable volume, and it formerly flowed away in the opposite direction to Tequezquitengo, emptying at Puente de Ixtla into the stream formed at that point by the junction of the Tembembe and Chalma. For some reason, now unknown, the administrator of San José changed the course of this stream into the valley, whence, by reason of its slopes of nearly equal height on all sides, the waters found no exit. The little lagoon began to increase in size. It first invaded the grain fields and gardens, then the first houses of the village, then the church; rising and rising until it finally desolated the entire place. The unhappy inhabitants fled from their native pueblo, which now may be seen like an enchanted memory as it rests in the depths of the lake. Two miserable huts standing near the bank were all that remained when we visited the spot. The lake continued to expand and to rise in level year by year, until eight or ten years ago, when it reached its maximum by attaining an equilibrium between the quantity of water entering and that lost by evaporation and infiltration. The shape of the surface is that of an oval, whose length and breadth are something like two miles and one-and-one-quarter to one-and-one-half respectively. The maximum depth is said to measure something like eighty meters, which we believe to be correct, for the level of the lake has been fixed, as upon a gigantic and melancholy hydrometric column, at the last cornice of the tower of the temple, which was built upon the higher part of the plain that to-day forms the bottom, leaving nothing unsubmerged except the cupola." — *Boston Herald.*

BOOKS AND PAPERS

THE two painters whose lives have recently been published by the Librarie de l'Art, and which form part of the series of "*Les artistes célèbres*,"[1] are as dissimilar as it is possible for two persons to be who express their thoughts through the same medium. Fortuny died famous at thirty-six. Prud'hon lived to be sixty-five, but he had not attained much reputation at the same age that Fortuny had completed his career. The charm of the older painter is beauty of form and composition; that of the younger man, color and light. Prud'hon was a poet; Fortuny the most prosaic of artists. Prud'hon's taste lay in classic subjects: Cupids, Psyches, Zephyrs, or the Muses; Fortuny's was for all that was wild, fantastic and *bizarre*. The art of the one was serious, dreamy or tragic; that of the other highly dramatic. Even in their scheme of color they were opposed — the one always cool and gray, and sometimes verging even on the black; the other, brilliant, sparkling and sunny. This probably was somewhat due to their birth, and fate in life. Both the sons of poor working men, they were alike in losing their parents at an early age, and in being dependent upon friends for their education; but here the similarity ends, for Prud'hon seems to have been pursued by an inexorable fate, while Fortuny became quite early in life, the beloved of the gods.

Pierre Paul Prud'hon (or Prudon, as it was formerly written) was born on the 4th of April, 1758,[2] at Cluny, in the Province of Bourgogne, the house still remaining in a passage in the parish of St. Marcel.[3] His father was a stone-mason, and he was the last of ten children; but he had the misfortune to lose both parents in the space of four months, when he was quite young. His first protector was l'abbé Besson, who made him an *enfant de chœur*, and taught him the first rudiment of education; and so fond was the recollection Prud'hon had of the good curé, that on his return from Rome, he made a portrait bust in wax of his old friend, which is still extant. Through the influence of Besson, the boy was admitted to the school at the Benedictine monastery, and there he received his first lessons in drawing. He made his colors from the juice of flowers and plants; and he fabricated his brushes out of pieces of horse-hair. With these inefficient tools, he copied some of the pictures belonging to the monks. When he was sixteen, the same good priest obtained an introduction for him through Monseigneur Moreau, Bishop of Dijon, to François Devosge, who was also the master of Rude, Petitot, Doyen, etc. Unfortunately, he became entangled soon after in a love affair, which ended in a miserable marriage, and was the cause of most of his subsequent misfortunes. Bad-tempered and disorderly in all her actions, Jeanne Pennet became, not only a charge, but a disgrace, and a perpetual worry to him. Happily, a friendly hand was stretched out to help him through his difficulties, and it was owing to the commissions given him by the Baron de Joursanvault, that he was enabled to live and keep his family.

We glean an insight into Prud'hon's character, from a letter of the Baron's, commending the artist to a friend in Paris, when he left his native place for that city. After speaking of another painter, one Naigeon, M. de Joursanvault goes on to say: "Born of a weaker temperament, easily making friendships, and never doubting those he loves, M. Prud'hon may easily fall over the most frightful precipices. His predominant ambition is to rise out of the crowd of mediocre painters; he works arduously; but he wants some one to make him work."

On his arrival in Paris, he was fortunate enough to find a lodging with some honest working people named Fauconnier, in the Rue de Bac. He became very intimate with the brother, and fell in love with the sister, not having the strength of mind to tell them that he was married; but so great must have been his fascination with women, that although the young girl repelled his attentions, she never reproached him with deceiving her, but remained his faithful friend, and never married.

At this time Prud'hon received a commission from the professor of the Academy of Dijon to paint a ceiling for "*les Etats*," and it is curious that, like Fortuny in a similar case, it weighed upon his mind all the time he was in Rome. A pleasing trait in Prud'hon's character comes to light during the *concours* for the Prix de Rome. It appears that while working in his *loge*, he heard sighs on the other side of the wall, and breaking part of the partition, he found his rival in despair over his picture. Seizing his friend's brushes, Prud'hon went on with his work, and so good was the result, that it gained the prize; but the young man declaring to whom he owed his success, Prud'hon took his place and went to Rome, with his former fellow-student, Petitot. Prud'hon was never a colorist, and it is to this fact, possibly, that we may attribute his admiration for Leonardo da Vinci. "One who has surpassed Raphael in ideas, in reflection, in sentiment, and in perspective, is the inimitable Leonardo, the father, the prince, and the first of all the painters," he says, in one of his letters. But what seemed to influence him more than anything in Rome was the Faun of the Capitol; and it is to this statue that we owe the type of face always adhered to by Prud'hon. Mme. A. de Tastu (*née* Voïart) points this out in a letter to M. C. Gueullette, and proves thereby that the painter adopted the type before he became acquainted with Mme. C. Mayer, who certainly, judging from a sketch of Prud'hon's, much resembles the Faun. "This style of head," she says, "was painted by Prud'hon long before he knew Mme. Mayer. It came to him from an antique statue, which was the object of his own particular predilection, and which he had much studied — that of the little Faun."

The visit to Rome fortified Prud'hon in his love of form, which, as we have said, is his great charm. Always pagan in his tastes, the antique influenced him far more than Christian art. In his drawings of "La Pais," "La Victoire," and "La Navigation," the treatment of the drapery is quite classic in design.

Prud'hon exhibited for the first time in the *Salon* of 1799, when he was forty-one years of age; the sketch for the picture "La Sagesse et la Verité" gaining for him a studio and rooms in the

[1] "*Les Artistes Célèbres,—Prud'hon*," par Pierre Gauthier. J. Rouam, Paris, 1886.

[2] Voïart, de Quincy, C. Blanc, and Arsène Houssaye, say 6th April, 1760; Delécluze, 1765; Delacroix, 1759.

[3] A vignette of the house was published in the *Magazin pittoresque* for 1857.

Louvre. Success now came to him. He was commissioned to paint some of the Louvre ceilings and other works; but his domestic miseries seem to have multiplied, and after various difficulties, culminating in a scene with the Empress Marie Louise, his wife was shut up in an asylum.

We now come to the romance of Prud'hon's life, which ended so tragically for Constance Mayer. Neither young nor beautiful, she was admired by the painter, and, living in another part of the Sorbonne, their intercourse was so frequent that she became his pupil. Clever, though too imitative, her pictures show the influence of her different masters, Suvée, Greuze, and Prud'hon; some of them even bearing the mark of the latter's touch, as well as his influence. Of a lively temperament, and possessing a charming expression rather than positive beauty, Mme. Mayer became the friend and mistress of Prud'hon. They worked together, and Prud'hon often took his pupil as model. In 1815 he was admitted to the Institute, and was at the height of his reputation, when a calamity overwhelmed him, from which he never recovered. Mme. Mayer had been suffering some time from a bilious complaint, and was subject to fits of depression. One day she said to Prud'hon: "If you became a widower, my friend, should you marry again?" "Never," replied Prud'hon, reminded at once of all his matrimonial troubles. Thereupon Constance Mayer left the *atelier*, took a razor from the next room, went into her own, and cut her throat. To a nature like Prud'hon's, impulsive, impressionable and melancholy, such a tragedy naturally threw him into despair. He passed the rest of his days with M. de Boisfremont, but never recovered the shock. He went on painting, but his power was gone, and in 1823 he passed away, uttering these words: "*Ne pleurez point, vous pleurez mon bonheur.*" He was buried in Père la Chaise, by the side of his pupil and friend, Constance Mayer.

Of his works, one of his most charming is "Zephyre," a boy of four or five, balancing himself on the branches of a tree, over a running stream. All Prud'hon's children are exquisite: they remind us of Raphael's in their chubby roundness. The Louvre possesses several pictures and drawings by Prud'hon; some, such as "La Justice et la Vengeance divine poursuvant le Crime," grand and noble; others, like "The Assumption," weak and false in sentiment. His taste was essentially a classic paganism, and his attempts at religious art are failures. He also designed various articles of furniture for Napoleon, notably the cradle of the little King of Rome, and a cheval-glass for the Empress Marie Louise. His technique is powerful, but his coloring black. Intending to work in the manner of Velasquez, Van Dyck and Paul Veronese, and reproduce their exquisite pearly gray tones, he omitted yellow from his palette, with the result of producing cold black or brown tints.

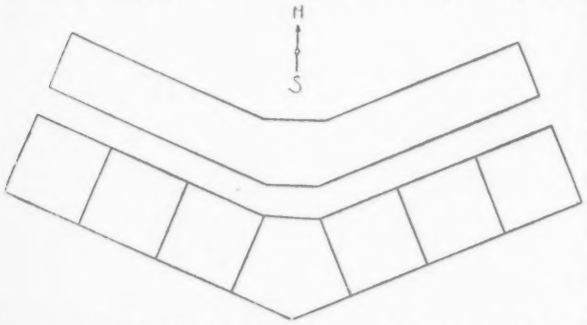
COMMUNICATIONS

THE ORIENTATION OF HOSPITALS.

PHILADELPHIA, PA. April 3, 1887.

To the Editors of the American Architect: —

Dear Sirs, — Many years ago a friend wrote me relative to a hospital he was to superintend the building of, and in which he was greatly interested and a large contributor. He sent me the plans, in which I found the architect had given the sunny exposure to the apothecary's shop, business-rooms, etc., and had put the patients' wards on the north. I sent my friend the details of the Paris hospitals, showing that a much larger percentage of recoveries took place in the sunny wards. In consequence, the whole plan was changed. As hospitals will always be built, it seems to me that you might add to your already great usefulness by calling attention to this matter. I enclose a rough plan of a building, in which every ward gets sun



for fully three-fourths of the day. Perhaps if you offered one of your competitions for the best arrangement of a hospital, good ideas would be elicited. Very truly, M. C. L.

A PLUMBER'S OVERSIGHT.

PHILADELPHIA, PA.

To the Editors of the American Architect: —

Dear Sirs, — Chancing to pick up your number of January 1, the exploits of plumbers there mentioned leads me to send you the following: Last autumn, as a precaution, I directed a plumber to examine my large tank and see that all was in order for winter. Nothing was wrong, you will understand; it was a precaution, simply. With two men, he labored two days; the next day the ceiling underneath was dripping, and when discovered had soaked a bed, etc. He had put on a new overflow pipe (the tank is fed by a water-wheel), and had not observed that his pipe was choked. L.

NOTES & CLIPPINGS

Liquid-Fuel Experiments. — Last autumn the Russian Government adopted a new type of liquid-fuel furnace, invented by Lieutenant Pashinin, for the torpedo-boat Lerke. Experimental trips before the close of the season demonstrated the success of the new invention, but no details were published as to the results obtained. Since then the same furnace has been fitted to two steamers, built by the firm of Butz and Company, St. Petersburg, for service on the River Oxus. A trial with these took place a few days ago, in the presence of a large number of influential personages, and, according to the *Novoe Vremya*, was again a complete success. The trial demonstrated that 1 pound of petroleum refuse evaporated 15.6 pounds of water, or 2½ times more than coal. During the consumption of the liquid-fuel, a sheet of white paper was held at a height of 14 inches above the funnel, and at the end was neither discolored nor marked with traces of soot. Compared with other systems in use in Russia, the *Novoe Vremya* says that whereas the proportion between the expenditure of coal and oil refuse is 2 to 3, the proportion in the new invention is 1 to 2½. Probably further practice will lead to better results than even these, as at present, owing to the low price of liquid-fuel, Russian engineers have no inducements to be economical. At Baku the price per ton is often as low as 4*d.*, and the question of economy is never thought of at all. On the Volga, however, the case is different, and the farther from Baku the more careful the engineers are found to be. It is expected that Pashinin's furnace will be applied this year to a large number of torpedo boats in the Black Sea, where the supply of liquid-fuel is now plentiful. — *Engineering.*

The Welsbach Incandescent Gaslight. — We noticed, a few weeks ago, a very beautiful application of the refractory property of zirconium made by Prof. Auer v. Welsbach, of Vienna, in which a cone of net, or similar material, is saturated with a solution of the metal, and exposed to the heat of a Bunsen burner with the result that all the combustible portion of the cone is burnt away, leaving a delicate and incombustible skeleton of zirconium ash, which the heat brings to such an intense state of incandescence that a luminous value of seven or eight candles can be obtained per foot of gas consumed. The idea is very ingenious, and the light is very beautiful, and fragile as the luminous ash is, and liable to destruction at slight provocation, there appears no doubt that the system may be made useful and have a commercial value. But we think that the Welsbach Incandescence Gaslight Company, whose prospectus has been lately before the public, set too high an estimate on the value of the patents, in asking for a part of them, half a million sterling, including, of course, purchase money (£300,000) and working capital. It is true that this sum includes the patent rights in eighteen countries; but Norway, Denmark, Tasmania, Queensland, and so forth, are not large gas consumers, and, in fact, England, France, and Belgium are the only countries in the list on the company's prospectus really valuable. That, however, is a point on which Mr. Punchard and the other promoters have to convince the investing public. But we cannot forget how the whole cause of electric lighting suffered a few years since, from company after company being launched with prodigious capitals, and now that there is a new phase in the practice of artificial illumination, it is to be regretted that the first venture is not of more moderate proportions. For it would be absurd to assume that with the Welsbach system, finality has been reached in this direction. We ourselves are thoroughly acquainted with a system which will be shortly brought before the public as a commercial undertaking, not as a financial venture, which approximates very closely to the results obtained by Professor Auer, but with this important difference, that the light-giving medium is indestructible, instead of being of extreme fragility. And this system will doubtless be followed by others of equal or superior merit and ingenuity. It would have been very interesting, from our particular point of view, if the prospectus of the Weisbach Company had informed us exactly how far the system "has been most successfully installed in Paris," what "extensively adopted" actually means, as regards Vienna, and what favor it has found in Berlin and "other cities," because, without such information, we cannot tell how the cone of zirconium ash stands in general use, what its average life is, and whether the luminous standard is maintained, or whether, after a comparatively short time, it decreases; our own experience has been that it does decrease, but perhaps our experience was unfortunate. The light has been on show at a few places in London, but not long enough to make useful deductions, and the framers of the prospectus would have rendered really a great service had they given precise information on these points It scarcely falls within our province, but we may remark that the abrupt secession of three members of the Board during the days the subscription list was opened, or immediately after it was closed, was almost, if not quite an unprecedented event. Probably a full explanation will be forthcoming of this precipitate retirement on the part of the late directors; we notice that the remnant of the Board has published an explanation, and announced the issue of an amended prospectus, which will be read with interest. Possibly, Lord Beaumont, Mr. White, and Mr. Poston were of the same opinion as ourselves, that the capital asked for is too great, and that a mistake has been made in this way, which may risk the profitable development of a beautiful invention, capable of extensive applications under favorable conditions. — *Engineering.*

Employers' Liabilities.—Messrs. Harland & Wolff, shipbuilders of Belfast, Ireland, write as follows to *Engineering:*

The action of Mr. McGeagh *v.* ourselves, tried last week before Judge Harrison and a special jury at the Antrim Assizes, being, we think, of more than usual interest to the engineering trades and employers generally, it has occurred to us that you might consider it worth while to publish a short *résumé* of the case, the more so that the ordinary newspaper reports hardly bring out the special points on our side as clearly as we imagine they deserve.

The action was brought under the common law, not under the Employers' Liability Act, and was for injuries undoubtedly suffered by the plaintiff through the breaking of a chain which carried a balance weight. The machine was a large self-contained drill, of which the spindle was balanced by a weight of about 9½ cwt., suspended by two three-eighths-inch chains.

The evidence given for the plaintiff went merely to prove the fact of the breakage and its result, while no evidence whatever could be produced of negligence on our part. On our side it was proved that we employed one of the best makers in the Kingdom (Messrs. Smith, Beacock & Tannett, of Leeds) to manufacture the machine, that the chain had a factor-of-safety of 19, and, therefore, greatly in excess of all recognized rules, and that no external examination could have detected a defect in the link that broke.

The case was three times before a jury, and before fifteen judges altogether. On the first trial the jury disagreed, on the second they found a verdict for the plaintiff with £500 damages, but the judge having referred the point of law, on which we relied, to the full bench, the verdict was reversed, whereupon the plaintiff appealed. The Court of Appeal, through some misunderstanding of the evidence, ordered a new trial, giving us the option of taking the case into the House of Lords, and we elected for the new trial, which was the one just decided, as we considered that it would be better to have the misapprehension which some of the judges evidently had, as to the facts, removed by the evidence clearly given in the new trial. The result has been a clear verdict in our favor, and being, as we think, strictly in accordance with the evidence, should form an important and valuable precedent in all future cases, where actions are brought against employers for the consequences of accidents beyond their control.

Had the plaintiff approached us at the outset in any other way than by the medium of a solicitor's letter, there would probably have been no trial, as we felt for his misfortune, although caused by no fault of ours; but in justice to ourselves, and other employers, we could not do otherwise than resist, by all means in our power, the attempt to enforce, by legal proceedings, a claim which we considered neither legally nor morally tenable.

However, as we have now had the case decided in our favor, we have adopted the suggestion of the Court, that the plaintiff should receive a substantial solatium.

A Legend of the Walls of Algiers.—In many cases the recollection that a death occurred when the church or castle was built lingers on, but its cause is forgotten, and a new legend has been invented to account for it. This is probably the origin of the stories of the murder of an apprentice by his master. An apprentice was killed and buried in the wall, not out of jealousy, but out of a notion of giving stability to the wall. Perhaps the Mohammedans have a similar notion, for, when the walls of Algiers were built of blocks of concrete in the sixteenth century, a Christian captive, named Geronimo, was placed in one of the blocks and the ramparts built over and about him. Since the French occupation of Algiers a subsidence in the wall led to an examination of the blocks, and one was found to have given away. It was removed, and the cast of Geronimo was discovered in the block. The body had gone to dust, and the superincumbent weight had crushed in the stone sarcophagus. The block is now, we believe, preserved in the cathedral of Algiers.

In 1514 the spire of the cathedral church of Copenhagen was erected. A carpenter's assistant had an altercation with his master as to which had the steadiest brain. Then the master ran the beam out from the top of the tower, took an axe in his hand, walked out on the beam, and struck the axe into the end of it. "There," said he to his man, on his return, "go out and recover the axe." The assistant instantly obeyed. He walked out; but when he was stooping to take hold of the axe it seemed to him that it was double. Then he asked, "Master, which of them?" The master saw that he had lost his head, and it was all up with the man, so he said, "God be with your soul!" At the same moment the man fell, and was dashed to pieces in the market-place at the foot of the tower. It is possible that this may be the true version of the story; but it is more likely that the man was flung down by his master, with the deliberate purpose to secure by his death the stability of the spire he had erected.—*Cornhill Magazine.*

Screw Systems.—The world of machinery is parcelled out to-day between the screw system devised in this city by Mr. William Sellers and that invented in England by Sir Joseph Whitworth, and the choice of screws the world over is being rapidly narrowed down to these two systems—one straight-edged and the other curved. The April number of the Franklin Institute's *Journal* gives an interesting correspondence, drawn out by a letter from the Society of German Engineers, which is considering the adoption of a screw based on the measurements of the metrical system. The letter is accompanied by the statement of London *Engineering* that the Sellers, or straight-edged screw, is going out of use in this country. The *Journal* prints a number of letters on this subject which show that since its adoption by the United States Navy in 1868, and the Pennsylvania Railroad, this system has come into use on 2,200 miles of railroad, it has been generally adopted by the large private establishments all over the country engaged in constructing the heavier classes of machinery, and the Pratt & Whitney Company report that 90 per cent of their orders require this thread and pitch. To many this struggle between various screw-threads would seem trifling, but it is on advantages like these that commercial supremacy turns and the general adoption of the Sellers or Whitworth system on the continent of Europe to-day would leave its mark for the next half century in determining whether American or English models, inventions and machinery were most employed, and affect national profits on the trade and manufacture of these objects in all parts of the world.—*Philadelphia Press.*

TRADE SURVEYS

Among the favorable features in the industrial and business world are the steady increase in the volume of currency, amounting, all told, to $60,000,000 in eight months, the steady improvement in the value of real estate, amounting to some hundreds of millions within a year, the expansion of a healthy building activity, estimated at from twenty-five to thirty-three per cent over last year, and the steady organization of railroads, manufacturing, and general business interests. Following these favorable conditions is an increased purchasing-power upon the part of the masses of the people. Among the unfavorable features, or rather possibilities, may be mentioned the lack of a permanent national banking system, the possibility of an over-development of railroad building, manufacturing and house building, the possibility of an undue appreciation of real-estate values, and the possibility of a renewal of labor agitations. Few subjects have been more closely studied by business men in all avenues, than that of guaging production to demand. If the country is to be visited with industrial and financial ups and downs this fact, or even the probability of it, will have considerable weight with the industrial and railroad captains of this age, who are leading in all the great enterprises. There are a variety of questions to be considered by those who control the investment of enormous capital; some of these questions lead into the domain of theory, others are bounded by the limits of experience. The practical men are discounting all these probabilities, and are basing their probable future course upon the one great fact, that the consumptive requirements of the country must, of necessity, steadily increase year by year. There is no doubt but that some sort of an increase in currency, year by year, is favorable to increased activity; at the same time it is true that increased currency, while stimulating healthy activity, also stimulates speculation, and creates speculative values. These speculative values act indirectly in the nature of a taxation on productive labor. We are now making up for the dulness of 1884–5; for a year or two more, at least, we are safe in our present phenomenal activity, what 1889 and 1890 may bring forth is too far off for all excepting those who are concerned in the safe investment of capital for future returns. It has, heretofore, been said that as long as consumptive requirements are not fully provided for there is room for and need of expansion; and increased production, and no excuse for restrictions, depressions, panics, or declining rates of compensation to labor. Our advices from all industrial centres during the past few days indicate a gradual restoration of confidence which existed earlier in the season. The readjustment of railroad rates is steadily going on, and public opinion is recognizing the essential merits of the new legislation. The railroad companies, who were naturally jealous of their absolute control over freight rates, will, no doubt, gradually come to recognize the justness of the law, and the advantages which are to flow from it. Railroad building is still projected in the West and South. All kinds of building operations are increasing, and something akin to a boom is in progress, more particularly in the Western States. Architects are extremely busy, and builders are full of contracts. Reports just published this week from the American Iron and Steel Association show that last year's pig-iron production was forty per cent in excess of that of 1885; Bessemer-steel ingots forty-nine per cent; steel rails sixty-four per cent; crucible-steel ingots twenty-five per cent; rolled iron twenty-six per cent; nails twenty-two per cent. For every twenty tons of crude iron made in 1876, sixty-three tons were made last year. For every five tons of Bessemer ingots, twenty-five tons. For every four tons of steel rails, seventeen tons. For every ten tons of rolled iron, twenty-two tons. For every four kegs of nails, eight kegs.

Old rails have advanced within twelve months at Atlantic ports from $23 to $28. Number 1 Foundry from $18.50 to $21. Steel rails at mill $34.50 to $39.50. Merchant bars $1.90 to $2.20. Imports of iron and steel, including tin plates, last year were 1,230,393 tons against 647,895 tons. At the opening of the year 23 blast-furnaces were in course of erection; since then perhaps as many more have been projected. There are 64 Bessemer converters in operation, and the production of steel ingots for 1886 was 2,541,393 net tons. The total steel output last year averaged 100 pounds per head of population. The production of coal was 106,280,033 tons.

The enormous expansion taking place suggests the possibility of overproduction, but as long as the country can pay dividends on two or three thousand million dollars' worth of material stock, trouble of this sort need not be borrowed. The great industries are all prospering, confidence is being restored by a partial return to the former freight rates within State limits. Builders are buying freely.

Agriculturalists are encouraged and implement-manufacturers are full of summer orders. Wood-working machinery-makers, and planing-mill and saw-mill machinery-makers have increased their work this month enough to preserve firm prices on all good work.

Architects are very busy in all cities from which reports are received. Bank, mill, warehouse, factory, church, and school-house building will be more abundant this year. River and lake crafts are called for. Coastwise tonnage is scarce. Cars are needed faster than supplied. This general activity is not of a haphazard character, but is the product of far-seeing enterprise and careful calculation. The development of small industrial enterprises is a favorable feature. Manufacturers are putting money into small houses in the South where there is an absolute scarcity of dwellings, and builders, with the assistance of local capitalists, are, in several cities, such as Memphis, Kansas City, Wichita, Birmingham, and Chattanooga, preparing to supply a demand which promises to pay excellent returns. As remarked months ago, the proper housing of the wage-workers of the world promises to engage the attention of a great deal of capital and enterprise. Commercial failures show that slack management is as dangerous as ever in business. The multiplication of little industries show that men of small capital have more favorable opportunities than in years past. Democratic freights in transportation will encourage small producers in new localities. The decentralization of our industries is progressing steadily, and the effects will be marked. The work which should have been done in 1883-4-5 is now being pushed through, under better surroundings. The rush of foreign laborers will continue until an equalization is established, and until employers will be placed in possession of an additional factor-of-safety from undue dictation. The law-makers are hastening to acquit themselves in the matter of legislation, but the deeper causes at work may, in the future, nullify the anticipated benefits of law, arbitration and combination. The exceptionally active demand for labor leaves employers less latitude to resist or barter for more favorable terms. Their turn will come as it has in times past.